TREE LOCUSTS OF THE GENUS *ANACRIDIUM*

(*Orthoptera, Acrididae*)

BY

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INTRODUCTION

The genus *Anacridium* was established by Uvarov in 1923 to include three species and one subspecies. Since then, abundant material of specimens of this genus became available and a more comprehensive revision can now be undertaken. Such a revision is greatly needed because of considerable confusion with regard to some previously known and common species, and in order to include those recently described and new ones. Another reason for the revision is the actual, or potential, economic importance of some of the species. The available information on the ecology, life-histories and habits of *Anacridium* species includes some points of general interest and we thought it worth while to summarise it.

All descriptions, including those of the new species and subspecies, are by V. M. Dirsh.

We should like to record our thanks to the authorities of several museums who supplied us with material, including some types; to Mr. J. A. C. Rehn for photographs of types of his species; to Mohammed Hussein Bey of the Egyptian Locust Research Organisation, for most valuable unpublished information and photographs; and to several members of the Desert Locust Survey, particularly, Mr. T. Macpherson, for specimens and photographs.

TAXONOMIC NOTES ON THE GENUS

The genus *Anacridium* belongs to the well defined group *Cyrtacanthacrini* (Uvarov, 1923) of the subfamily *Catantopinae*. It is distinguished from other genera of the group by the specialised male genital appendages (the trilobate subgenital plate is otherwise found in this group only in the genus *Acanthacris*) and by the presence of a dark fascia on hind wings, which may vary from a narrow spot to the darkening of almost the whole wings but is never completely absent.

The genus was established by Uvarov in 1923 with *Gryllus Locusta Aegyptius* Linnaeus 1764 as the type. This Linnean species, and a large number of others, have previously been referred to the genus *Acridium* Serville, the application of which name is still under dispute, but it cannot, in any case, be applied on any formal grounds to the present genus *Anacridium*.

A recent generic synonym of *Anacridium* is *Flamiruizia* Lieberman (1943, *Rev. Soc. ent. Argentina*, 11 : 401) based on an unlabelled specimen found in an old collection in Chile and, therefore, assumed to be a Chilean insect and described as *F. stuardoi* Lieberman; Ogloblin (1943, *Notas Mus. La Plata*, 8 : 147) has proved its identity with *Anacridium aegyptium* L.

Two species described under the generic name *Anacridium* do not belong to this genus, as follows:

Anacridium arabicum Uvarov (1930, *Ann. Mag. nat. Hist.* (10) 6 : 185) has already been removed to a distinct genus *Adramita* Uv. (1936, *Linn. Soc. J. Zool.*, 39 : 547).

Anacridium javanicum Willemse (1932, *Ann. Soc. ent. Fr.*, 101 : 143) is almost certainly a member of the genus *Valanga* Uv.

In the present revision, twelve species of *Anacridium* are recognised, two of them and one additional subspecies being described as new. They are all very much alike superficially, but diagnostic features are found in the structure of pronotum, elytra and hind legs and in the colouration. The most reliable taxonomic characters, however, are offered by the structure of the male genitalia, especially the aedeagus, while the male

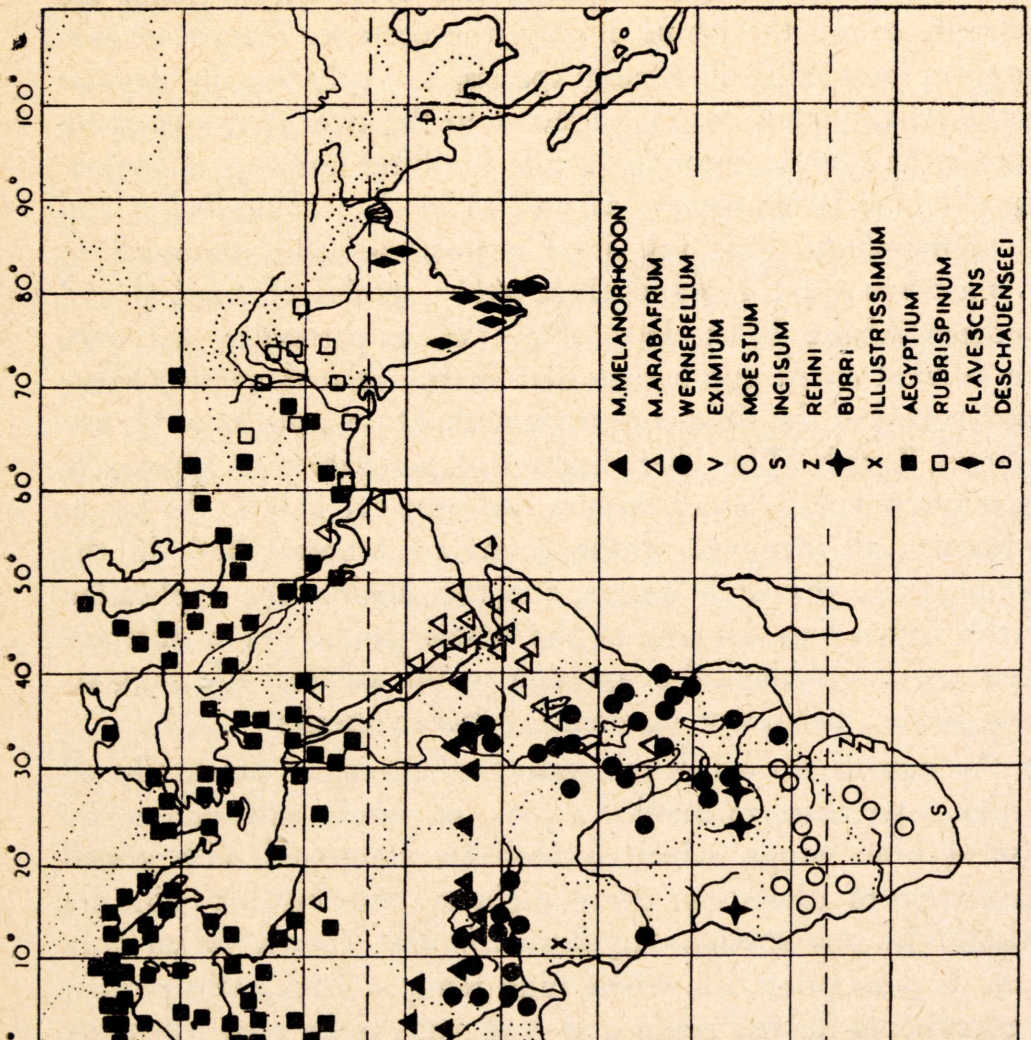
epiphallus (Fig. 18) and the female spermatheca (Fig. 19) proved to be somewhat uniform throughout the genus.

When all species are compared, two evolutionary trends are apparent within the genus. Firstly, the posterior margin of pronotum is rounded in all African species, and only broadly angular in the Asiatic ones, but definitely so in the two species ocurring outside the tropics. Secondly, while the hind femur is of normal shape in the latter species, as well as in *A. melanorhodon* and *A. wernerellum* (Fig. 11), it is characteristically narrowed in *A. moestum* (Fig. 12) and three other species of tropical and southern Africa. In *A. burri* (Fig. 13), in particular, not only the femoral shape approaches that in the related genus *Orthacanthacris*, but the tibia is covered with dense hairs as in *O. humilicrus* Karsch. This specialisation of posterior legs appears to be connected with more pronounced arboreal habits. As far as is known, all members of the genus are arboreal both in the nymphal and the adult instars, and this justifies the application of the name Tree Locusts to the whole genus, but a different degree of morphological adaptation to the arboreal life suggests some further behaviour difference between species.

As regards the wing colouration, there is, in practically all species, a tendency to develop a pink, or purple, suffusion at the base of hind wings, which is probably connected with sexual maturation of adults, but detailed observations on this point are lacking. In one species, *A. illustrissimum,* known to us only from its description, the whole hind wing is black; this pattern is exceptional for the genus and it remains to be seen when the male becomes known whether the species is really an *Anacridium*.

DISTRIBUTION OF THE GENUS

The group *Cyrtacanthacrini* to which the genus belongs includes about 30 genera, all of them palaeotropical in their distribution, with the sole exception of the genus *Schistocerca* which is represented by a number of species in the New World, but by one only (the Desert Locust) in the old.



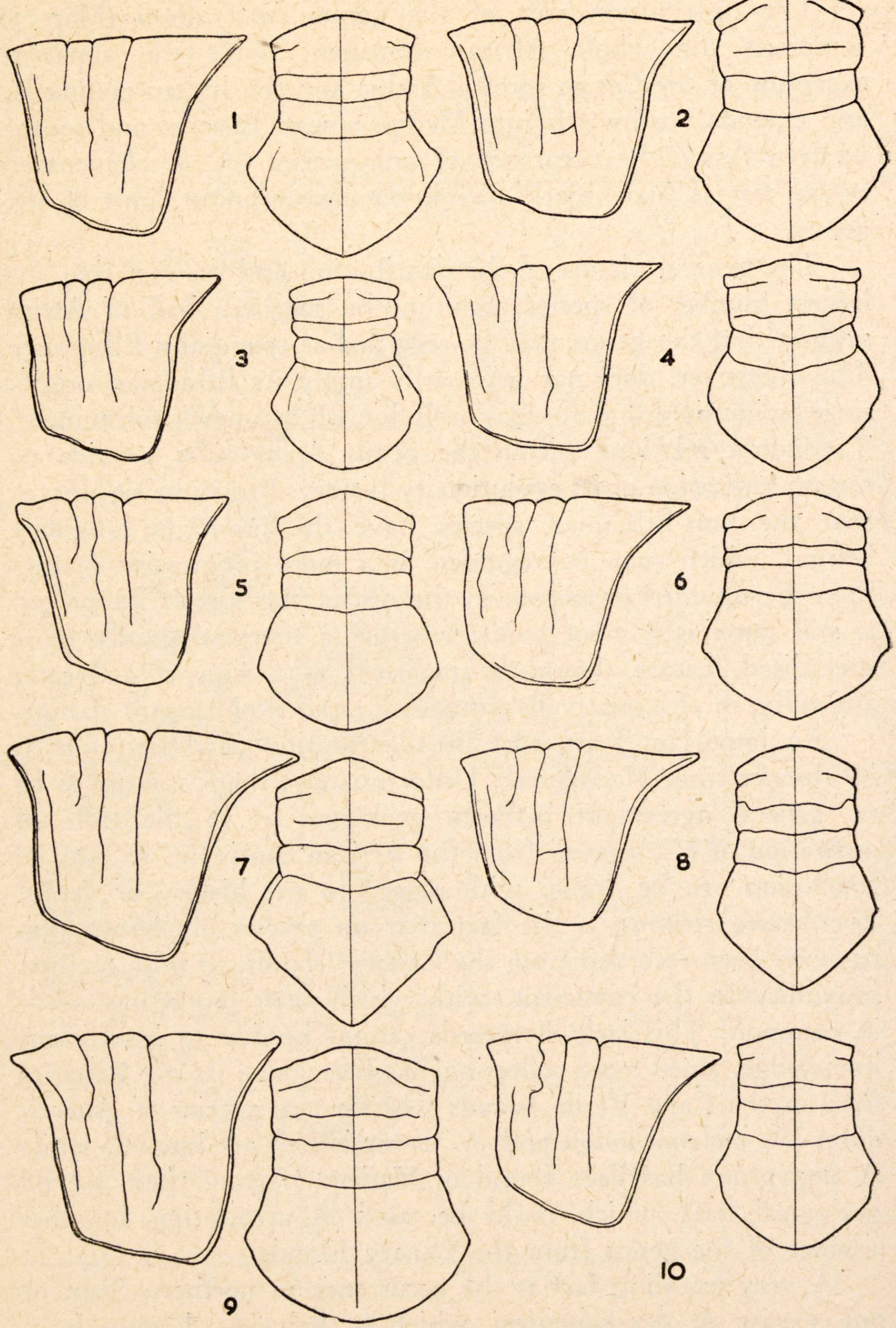
Map. 1.—Distribution area of the genus *Anacridium*

The distribution area of the genus *Anacridium* (Map 1) comprises the whole African continent (with the apparent exception of the Congo forest), Arabia and the Indian peninsula, and extends northwards into Mediterranean Europe, and south-western Asia; the occurence of one species (*A. deschauenseei*) as far east as Siam marks the known easternmost limit of the genus.

The general picture of the distribution and the fact that the largest number of species occur in the southern half of Africa suggest that the genus may be regarded as essentially Ethiopian. This, however, does not necessarily imply its Ethiopian origin, since an immigrant genus may well flourish in a new environment. Taxonomic relations within the genus *Anacridium* provide no certain indication of its evolutionary history. It may be significant that the non-Ethiopian species have the pronotum angulate behind, which may be regarded as a more progressive feature than the rounded pronotum in the rest of the species. However, it still remains a moot point, whether a morphologically more specialised feature should be regarded as a sign of a greater antiquity, or of a relatively recent and rapid evolutionary change.

An important feature of the distribution of *Anacridium* is its absence from Madagascar. Unfortunately, there appears to be no general agreement between geologists as to the time of separation of Madagascar from the African continent, so that no conclusion can be drawn with regard to the history of genus. Even more striking is the fact that no species of *Anacridium* has ever been recorded from the Canary Islands, in spite of their proximity to the continent, with which their fauna has much in common. This lack of records cannot be due to insufficient knowledge, since more collecting has been done in the Canaries than in the Cape Verde Islands whence two species of *Anacridium* (*A. melanorhodon* and *A. wernerellum*) are known, while *A. aegyptium* has been found in Madeira. Again, there are no geological data which could be used in accounting for this absence of the genus from the Canary Islands.

A very puzzling fact is the occurrence in northern Siam of one species *A. deschauenseei,* which is, however, known from a single female specimen.



Figs. 1-10.—Lateral and dorsal view of pronotum: 1, *A. melanorhodon melanorhodon*. 2, *A. m. arabafrum*. 3, *A. wernerellum*. 4, *A. burri*. 5, *A. moestum*. 6, *A. flaviventris*. 7, *A. aegyptium*. 8, *A. rubrispinum*. 9, *A. eximium*. 10, *A. rehni*.

KEY TO SPECIES AND SUBSPECIES

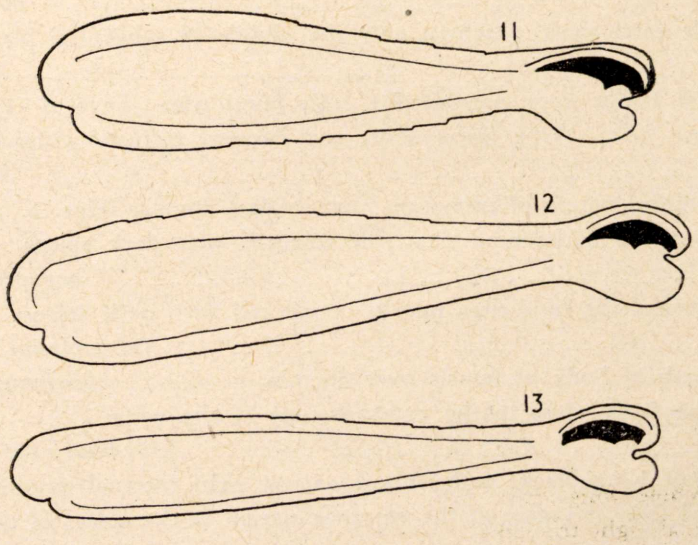
1 (24) Basal disc of wing light; wing fascia more or less developed.

2 (23) Wing fascia more or less in the middle of the wing.

3 (22) Length of body of female under 73 mm.

4 (19) Posterior margin of pronotum rounded or broadly obtusangulate with rounded apex (Figs. 1-5, 9, 10).

5 (10) Hind femur broad (Fig. 11). Anterior angle of pronotum, in profile, weakly projecting forwards (Figs. 1-3).



11

12

13

Figs. 11-13.—Posterior femur: 11, *A. wernerellum*. 12, *A. moestum*. 13, *A. burri*.

6 (9) Male subgenital plate broad, with short broad lobes (Figs. 14-15). Median carina of pronotum weakly incised by transverse sulci (Figs. 1, 2). Wing fascia infumate, reduced to a small spot near inner margin.

7 (8) Wing fascia very weak, and reduced to a small halfmoon spot near the inner margin of the wing; basal disc pinkish or colourless ... ... *melanorhodon melanorhodon* (Walker)

8 (7) Wing fascia passing across the whole wing, although narrower than the basal disc which is light violet-pink or faintly yellowish ... ... *melanorhodon arabafrum* sbsp. n.

9 (6) Male subgenital plate narrow with long, narrow lobes (Figs. 20, 21). Median carina of pronotum comparatively strongly incised by transverse sulci (Fig. 5). Wing fascia sharp and almost black, much broader than the basal disc which is light violet or pale-bluish green ... ... *wernerellum* (Karny)

10 (5) Hind femur narrow (Fig. 12) or very narrow (Fig. 13). Anterior angle of pronotum, in profile, distinctly projecting forwards (Figs. 5, 9, 10).

11 (18) Hind femur narrow (Fig. 12). Hind tibia above is not covered by dense hairs.

12 (15) Wing fascia distinct, complete, with the basal ray.

13 (14) Wing fascia dark brown or almost black, sharp. Anterior angle of pronotum, in profile, less projecting; posterior margin not raised (Fig. 5) ... ... *moestum* (Serville)

14 (13) Wing fascia light brown, its edges diffuse. Anterior angle of pronotum, in profile, more projecting; posterior margin raised (Fig. 9) ... ... *eximium* (Sjöstedt).

15 (12) Wing fascia very weak, incomplete, without the basal ray.

16 (17) Male cerci long, projecting beyond the apex of subgenital plate (Fig. 28) ... ... *incisum* Rehn

17 (16) Male cerci short, reaching only the middle of subgenital plate (Fig. 30) ... ... *rehni* sp. n.

18 (11) Hind femur very narrow (Fig. 13). Hind tibia above is covered with dense hairs. Wing fascia short and narrow, diffuse, without the basal ray ... ... *burri* sp. n.

19 (4) Posterior margin of pronotum more or less angular (Figs. 6, 7, 8).

20 (21) All spines of the hind tibia pale coloured with dark apices ... ... *aegyptium* (Linné)

21 (20) Spines of the hind tibia mostly orange-red with dark apices ... ... *rubrispinum* Bey-Bienko

22 (3) Length of body of female over 80 mm. ... ... *deschauenseei* Rehn

23 (2) Wing fascia close to the external edge of the wing ... ... *flavescens* (Fabricius)

24 (1) Whole wing black, with only a narrow light internal margin and with small light triangles on the external margin at the apices of the auxiliary vein ... ... *illustrissimum* (Karsch)

Range of measurements (in millimetres)

		Body	Pronotum	Elytron	Hind femur
A. melanorhodon melanorhodon	♂	53-63	10-12	59.5-65	26-28·5
	♀	54-72	10-13·5	57·5-71·5	25-32·5
A. melanorhodon arabafrum	♂	52-59	10-12	51·5-63	24-28
	♀	57-73	12-13·5	58-70 5	29-33.5
A. melanorhodon arabafrum	♂	45·5-56·5	8-10·5	47-56	21·5-25
(Garibaldi Pass, Ethiopia)	♀	53·5-55	11-11·5	58·5-61	26-27

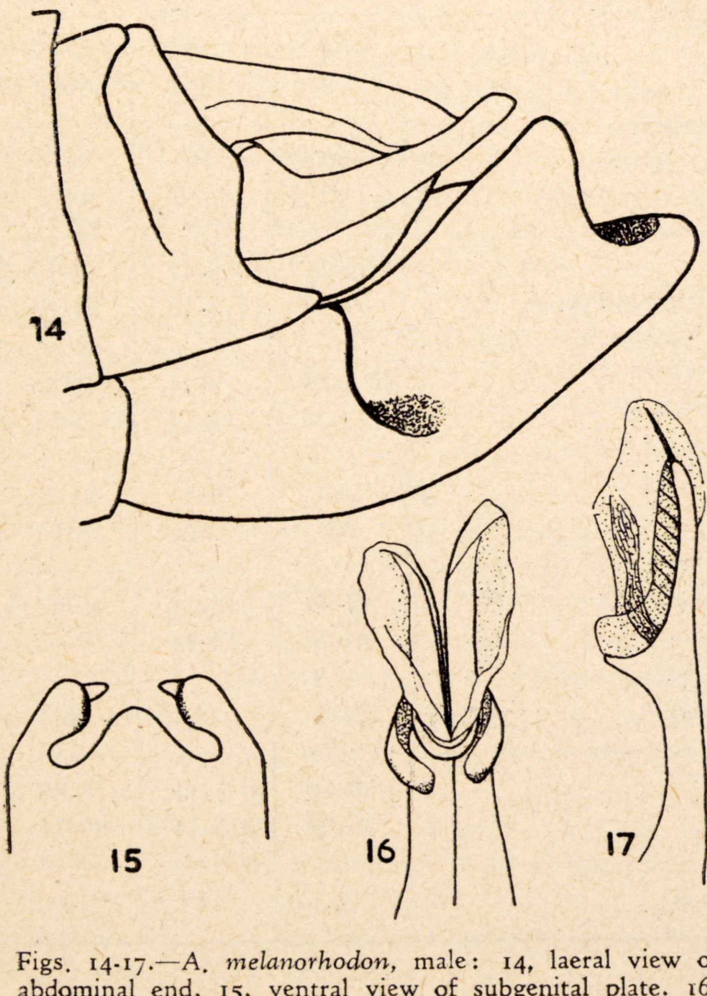
		Body	Pronotum	Elytron	Hind femur
A. *wernerellum*	♂	40-52	8-10	43·5-52 5	20-26·5
	♀	54-63	10·5-13	57-69	26-33·5
A. *wernerellum*	♂	37·5-43·5	7·5-8	39-44	18-22
(Emali range, Kenya)	♀	51·5-53	10-10	55-57	24·5-27
A. *moestum*	♂	44-48	8-9·5	50-53·5	22·5-25
	♀	58-64·5	12-13.5	63-73	31-35·5
A. *eximium*	♀	60	13	70	31·5
A. *incisum*	♂	45·5	10·1	46·5	23·5
	♀	54 5	12·2	56·5	28·2
A. *rehni*	♂	52	10	47·5	25·5
	♀	69	12·5	56·0	29·5
A. *burri*	♂	50	10	54·5	24
	♀	60	11·5	64	29·5
A. *aegyptium*	♂	45-51	10·5-12	44·53·5	22-26
(North Africa and Asia)	♀	59-73	12.5-15	54-63·5	27-33
A. *aegyptium*	♂	37·5-45	9-11	33-46	18-22·5
(Europe)	♀	51-58·5	12-14	48·5-61	24·5-29
A. *aegyptium*	♂	44	9·5	41·5	19·5
(Caucasus)	♀	57	12	50	25
A. *rubrispinum*	♂	42-45	10-11	46-47·5	23·5-24
	♀	56-64	12-14	58-63	28-28·5
A. *deschauenseei*	♀	81·5	16	82	37·5
A. *flavescens*	♂	50-56	10·5-11	51·5-53·5	24-24·5
	♀	59-69	13·5-14·5	69-71	32·5-33
A. *illustrissimum*	♀	75	14	- 70	34

Anacridium melanorhodon melanorhodon (Walker)

Text-figs. 1, 14-17; Plates, Fig. 49.

1870. *Acridium melanorhodon*, Walker, Cat. Derm. Salt., 3: 585.
1907 (February). *Orthacanthacris wernerella* var. *sphalera*, Karny, Sitz. ber. Akad. Wiss. Wien, Abt. 1, 106: 305.
1907 (July). *Acridium aethiopicum*, Finot, Ann. Soc. ent. France, 76: 269.
1910. *Orthacanthacris melanorhodon*, Kirby, Syn. Cat. Orth., 3: 445.
1923. *Anacridium moestum melanorhodon*, Uvarov, Ann. & Mag. Nat. Hist. (9) 11: 488 (*partim*).

♂. Median carina of pronotum, in profile, almost straight, weakly incised by transverse sulci; prozona slightly constricted,



Figs. 14-17.—A. *melanorhodon*, male: 14, laeral view of abdominal end. 15, ventral view of subgenital plate. 16, end of aedeagus, frontal view. 17, ditto., lateral view.

metazona widened behind and flat, its posterior margin broadly rounded. Lower margin of lateral lobe oblique, sinuate.

Prosternal tubercle compressed laterally; its anterior margin, in profile, oblique in the apical part, the posterior one vertical, apex obtuse.

Elytron projects well beyond the apex of the abdomen. Wing considerably narrowed to the apex.

Hind femur comparatively broad, ratio of length to width 4.6-5.2. Subgenital plate, in profile, broad, its lobes short and broad; viewed from below, median lobe broadly-triangular, obtuse at the apex, lateral lobe short, wide, rounded at the apex, approximated to the median lobe. Cercus long, strongly incurved, its apex close to the apex of subgenital plate. Aedeagus with wide, elongated oval, weakly chitinised apical lobes, slightly diverging at the apex.

Colouration light ochraceous-brown, sometimes with light pink shade. Antennae black, with the first and second basal segments light. Elytron with dark spots. Basal part (sometimes two thirds) of wing light pink, colourless or slightly yellowish; fascia infumate, short and narrow, without the basal ray. Hind tibia above and outside greyish-violet, inside violet; external tibial spines on both sides and internal spines on the inner side pale basally, red in the middle and with almost black apices; internal spines on the outside bright red with black apices.

♀. As the male, but larger. Ratio of length to width of the hind femur 4.5-5.4.

Specimens examined

Cape Verde Islands: St. Jago, *type;* St. Vincent, 1896 (Brit Mus.); Fogo, Mousteris, 29.VII.1934 (A. Chevalier) (Paris Mus.).

Rio de Oro: Mejeiris; B. Gandux; G. Amarraset; G. Erchekna; Tichla; U. Atui; K. Leganam; Le Glat; Aussert; U. Komba (Morales Agacino, 1949).

Mauritania: Boguent, Sbar, III.1937; Nouakchott-Rosso,

Tuijmaran, 16°30'N., 15°49'W., I.1937; Akjoujt, XII.1931 (Paris Mus.).

SENEGAL: Dakar, VIII.1929 (F. Vuiller) (Brit. Mus.).

FRENCH SUDAN: Kayes, VII.1922. El Qualadji, III.1922 (Brit. Mus.). Nema, 1-7.IX.1933; Nara, 16.VII.1933 (Paris Mus.); Segou, 1932 (A. Chevalier) (Paris Mus.); Middle Niger, Diafarabe, V.1932; Fana, V.1932 (O. B. Lean) (Brit. Mus.); Marede Gossi, Gourma-Rharous, 25.I.1934; Menaka, 27.II.1934; Diguisire, 15°40'N., 5°4'W., 10.VI.1946, swarm (B. P. Uvarov) (Brit. Mus.); Timbuctu; Lobi, 10°50'N., 5°30'W. (Paris Mus.); Cahort, Adrar des Iforas, 28.I.1934 (Paris Mus.); Takadji, Niafunke dist., XI.1950 (M. Roblot) (Anti-Locust Research Centre).

FRENCH NIGER COLONY: Aderbissinat, 15°37'N., 7°52' E., XI.1938; Gangara, 14°36'N., 8°27'E., XI.1938; Oursfan, I.1938 (Paris Mus.).

NIGERIA: Azare, 1924 (L. Lloyd); Kalkala, I.1933, III.1933 (F. D. Golding); Marte, 30.VIII.1930 (O. B. Lean); Dikwa, 12°03'N., 13°54'E., 18-29.VI.1949 (H. P. Johnston) (Brit. Mus.); Sherifuri, N. Gadau; Chad (Abeli Ashettammari to Kalkala); Gajibo (Golding, 1948).

FRENCH CHAD TERRITORY: Hadjer el Hamis, Rive S.-E. du lac Tchad, 29.IV.1935; Massakori-Moussoro, Bahr el Ghazal, Tchad, 20-23.V.1935 (Paris Mus.); Oudai, Biltine-Abeché (Paris Mus.); Lake Fittri, 11-13.II.1949 (H. B. Johnston) (Brit. Mus.).

ANGLO-EGYPTIAN SUDAN: Libyan desert, near Wadi Hawa, 24.II.1935 (M. H. Mason); Khartum, 30.X.1923 (R. Cottam); Khartum, VII.1909 (S. S. Flower) (Brit. Mus.); Wad Medani, 23.III.1923 (H. Bedford); Talodi, 14°41'N., 30°22'E., 24.IV.1926 (J. W. Cowland); Gendetu, North. Prov., 22.II.1924, El Obeid, 18.X.1924 (M. Blunt) (Research Division, Wad Medani).

ERITREA: Massawa (Brit. Mus.); Buri Peninsula, 25.I.1950 (Adefris Bellehu); Tessenei, 29.I.1951, swarm (T. Macpherson) (Anti-Locust Research Centre).

Taxonomic notes

Uvarov (1923) regarded *A. melanorhodon* as a subspecies of *A. moestum*, which view proved now to be incorrect; otherwise, his conception of it remains, with a modification due to the recognition of a new subsp. *arabafrum* (p. 23). The vast majority of specimens from continental Africa referred by us to this subspecies have the hind wing fascia as strongly reduced as it is in the type, a female from St. Jago, Cape Verde Islands. This character, however, is subject to variation and some individuals from the area normally populated by sbsp. *melanorhodon* (see page 21) have the fascia more extensive and approaching the condition found in sbsp. *arabafrum*. One such specimen is known to us even from Fogo, Cape Verde Islands, but it is legitimate to regard such cases as individual variation of one geographical subspecies in the direction of another, since the subspecific distinction holds good for the bulk of the population. Transitional forms appear to be more frequent in Eritrea, where sbsp. *melanorhodon* begins to be replaced by sbsp. *arabafrum*, and a sample (136 specimens) from a single large swarm taken at Tessenei in Eritrea, proved to contain a complete mixture of all transitions from one subspecies to the other.

Phases

Johnston (1932) has found both solitary and gregarious hoppers on acacias in the Anglo-Egyptian Sudan and described their colour differences analogous to phases in other locusts. Isolated hoppers were mainly green and resembled closely ph. *solitaria* hoppers of the Desert Locust (*Schistocerca gregaria* Forsk.), but differed from them in the Ist instar by the six apical antennal segments being brown, instead of uniformly green, and by the front margin of pronotum reaching close to the compound eye. In the later instars, solitary hoppers of *Anacridium* differed from similar hoppers of the Desert Locust by more compressed

and less distinctly arched pronotum. Crowded hoppers (ph. *gregaria* or, possibly, ph. *transiens*) could be distinguished from similarly reared hoppers of *Schistocerca* by their ground colour being greenish-yellow, instead of pure yellow, by the mainly black antennae, and by the different and less extensive black pattern. Adults reared from the distinct hopper types, did not differ much in their biometric characters, the mean E/F ratios in those from swarms being 2.24 in the males and 2.29 in the females, while in the solitary form the mean ratio was 2.33 in males and 2.27 in females. Morales Agacino (1949) who has studied carefully a series of specimens, all taken quite singly in Rio de Oro, has quoted the E/F ratio for females as 2.16-2.23, and for males 2.25. This evidence of two authors, based on a considerable material, makes it difficult to accept a statement by Roblot (1950), according to whom the E/F ratio in the gregarious phases is 2.20-2.40, and in the solitary 2-2.05; no information was given as to the source or the number of specimens on which this statement was based, and the only actual measurements quoted refer to one male (E/F 2.20) and one female (2.25); on the other hand, measurements of a pair of *A. wernerellum*, quoted for comparison, give the ratios 2.0 (male) and 2.1 (female), which suggests that these ratios may have been erroneously applied by Roblot to the supposed solitary phase of *A. m. melanorhodon*. To conclude, it appears that the phase, variation in this insect, affects only the colouration of hoppers, while adults do not differ biometrically, whether they are taken from swarms or singly. More detailed biometrical and experimental studies should be of interest, as this locust may present an example of incipient phase phenomena.

DISTRIBUTION AND ECOLOGY

The distribution area of this subspecies extends from the Cape Verde Islands in a narrow belt across the African continent included approximately between the latitudes 12° and 18°N. A northward extension to latitude 24°N. occurs near the Atlantic coast (Río de Oro, Morales, 1949), and to about 20°N. in the

Adrar des Iforas and in Air (Volkonsky & Volkonsky, 1940). In the east, this subspecies occurs in the corresponding zone of the Anglo-Egyptian Sudan, but is replaced in Ethiopia by *A. m. arabafrum* with clearly transitional forms occurring in Eritrea (see p. 23). Apparently isolated records from the Red Sea coast are based on an old discoloured female specimen from Massowah and another one, from the Buri peninsula. It will be seen that this picture of the distribution of *A. m. melanorhodon* is scarcely different from, though more precise than, that presented by Uvarov (1923, 1928), except that he did not then distinguish it from *A. m. arabafrum*. On the other hand, Chapman's (1945) notes and the map, showing three apparently discontinuous areas of distribution, one of them in S. E. Africa, is clearly due to a confusion not only with *A. m. arabafrum*, but also with some other South African species of the genus. His determinations have been, obviously, based only on wing colouration. As already shown by Golding (1948), Chapman's general conclusion that *A. m. melanorhodon* is «a coastal or damp climate form» bears no relation to facts, since its geographical distribution area coincides very closely with the Saharo-Sahelian and Sahelian vegetation zones (Zolotarevsky & Murat, 1938), which are characterised by sparse low xerophilus vegetation, with scattered *Acacia* and other small spiny trees (*Commiphora, Zizyphus,* etc.). According to Johnston (1932) leaves of acacias and *Zizyphus* are the favourite food of hoppers.

It must be remembered that nearly all distributional records are those of adults, and since this is a migratory insect (see below), its swarms, or individuals, may occasionally be encountered outside the normal breeding zone, which is probably even more narrow than the zone of adult distribution.

BIONOMICS

ANNUAL CYCLE.—Eggs are laid in moist sandy soil (Johnston, 1932), in cages mostly at night (María Volkonsky, 1943), but no observations on the ecology of oviposition in nature exist. Incubation period is given as 23-65 days by Johnston and 39-40

days by María Volkonsky. One female lays 1-3 egg-pods, each about 75 mm long and containing 150-200 eggs. Descriptions of hoppers, solitary and swarming, are given by Johnston (*l. c.*), and Volkonsky (1938) gave figures of eyes in hoppers.

There appears to be one annual generation, the breeding occurring during the monsoon rainy season, and the dry season is passed in the adult stage.

MIGRATIONS.—It is during the dry season that swarm flights of *A. m. melanorhodon* are frequently recorded; e. g., according to Golding (1948) fourteen swarms, recorded in Nigeria, occurred between January and April. A peculiar feature is that flights occur mostly at night or very early in the morning (Johnston, 1932; Chevalier, 1932; Roblot, 1950); this habit is so characteristic that it has earned the insect its Arabic name *Sari-el-lel* which means «night wanderer» (Johnston, *l. c.*). During the day swarms are found settled on trees (Plate, Figs. 61-62). According to Chevalier, swarms often fly at a considerable height, 200-300 metres above the ground. The extent of flights is not known, but it is possible that they take adults beyond the normal distribution area, and some of the northern records of occurence (e. g. in Río de Oro) may be due to such migrations, thougt in Nigeria no swarms have been observed south of latitude 11°N.

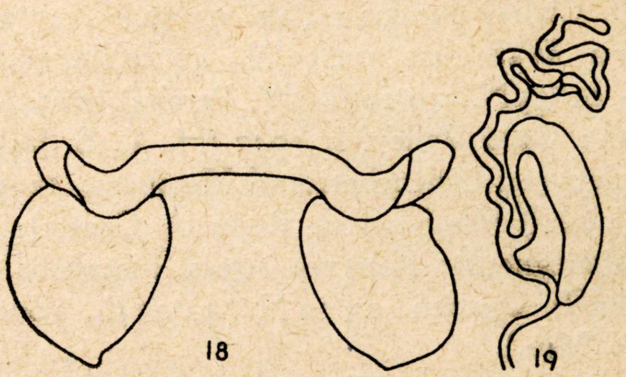
ECONOMIC IMPORTANCE

Adult swarms have been known to cause occasional damage mainly to the foliage of cultivated trees, e. g. the shea nut palm (*Buthyrospermum parkii*), oranges, mangoes and other fruit trees, eucalyptus and cotton (Chevalier, 1932; Johnston, 1932). Joyce (1952) recorded damage to milky grain of *Sorghum* in the Sudan. While the economic importance of this insect need not yet be seriously considered, it may increase should suitable cultures be introduced in the areas populated by it. Swarms of this Tree Locust are, however, sometimes mistaken for those of the Desert Locust (*Schistocerca gregaria* Forsk), causing unnecessary anxiety and confusion in records.

Anacridium melanorhodon arabafrum, Dirsh, sbsp. n.

Figs. 2, 18, 19; Plates, Fig. 50.

Differs from the typical subspecies only by the larger wing fascia, which passes across the whole wing but is narrower than the basal disc; hind wings otherwise are either faintly yellowish or pink with a violet tinge.



Figs. 18-19.—*A. melanorhodon arabafrum*: 18, epiphallus of male. 19, spermatheca of female.

TAXONOMIC NOTES

The degree of development of wing fascia appears to be more stable in this subspecies, than in sbsp. *melanorhodon*, since in a very large series of sbsp. *arabafrum* before us no cases of reduction of the fascia, likely to cause a confusion with the other subspecies have been found. A tendency towards a reduction of wing fascia is noticeable, however, amongst Eritrean specimens, and the case of the Tessenei swarm (see p. 19) proves the subspecific status of the two forms and their overlap in Eritrea.

Specimens examined

Tanganyika Territory: L. Eyassi, 03°20′S., 35°20′W., 31.V.1950 (F. B. Notley).

Uganda: Lake Kachira, 1931 (Brit. Mus.).

Kenya: L. Rudolf, mouth of Kabua R., III-IV.1931 (E. B. Worthington) (Brit. Mus.); Turkana, W. of L. Rudolf, VIII-X. 1930 (N. St. Clair); Sandaslo Pass, 02°52′N., 37°00′E., 10.VI. 1946; Mansa, Wajir dist., 02°30′N., 40°10′E., 10.VI.1947 (D. K. Kevan); 01°45′N., 39°10′E. (W. Pereira) (Brit. Mus.).

Ethiopia: Omo Valley, I. 1942 (H. T. E. Jackson); Garibaldi Pass, between Uolencheti and Metahara, 4200 ft. (K. M. Guichard) (Anti-Locust Research Centre); Dire-Dawa, VII.1942 (Meneghetti); Reserved Areas, Biocababa, 30.XI.1947 (Z. V. Waloff); Ogaden, 05°10′N., 42°05′E., 1000 ft. (D. K. Kevan) (Brit. Mus.).

British Somaliland: Hargeisa, III.1947; 9°36′N., 43°38′E., 22.III.1947; Ununuf Plain, 9°45′N., 44°40′E. (W. H. Wood); Kabri Bar, 10°21′N., 43°40′E., VIII.1946; Erigavo, 10°15′N., 47°30′E., VI.1946; Zeila, VIII.1935 (Peck) (Brit. Mus.); 10°58′N., 43°40′E., 3-4.III.1951, swarm (G. E. Stokes) (Anti-Locust Research Centre).

Italian Somaliland: Garoe, 12.X.1947 (Z. V. Waloff) (Anti-Locust Research Centre).

French Somaliland: Djibouti, 29-31.VIII.1926 (J. Omer-Cooper) (Brit. Mus.); Jibouti, VII.1951 (Moal) (Anti-Locust Research Centre).

Red Sea (H. W. Whyte) (Brit. Mus.).

Socotra (Brit. Mus.).

Arabia: Sakaka, 19.II.1935; Mecca, 10.I.1931, 4000-5000 ft., 19.I.1934; III.1936; 18.IV.1936; Jedda, V.1936; XII.1929 (including *type*); Khashabiya, 10.I.1937; Ashaira, V.1936; Masliva, 6.II.1937; Gizan XII.1936; Sabya, II.1937, XIII.1937 (H. St. J. B. Philby) (Brit. Mus.). Asir: Wadi Qanuna, 12.IV. 1948; Sabiya, 17°10′N., 42°30′E., 10.XII.1946, 3.I.1947; Knowba, 16°50′N., 43°12′E., 9.XI.1947; Ardha, 17°03′N., 43°03′E., 26-27.XI.1947 (G. V. Popov); Asir, Wadi Lasaba,

10.XII.1945; Tihama, nr. Qunfida (D. V. Fitzgerald); Wadi Qanuna, Qunfida, 31.III.1948 (B. P. Uvarov); Wadi Qanuna, XII.1948 (P. Stephenson); Yemen: Hodeida, 16.VIII.1946; Zeidiya, 20.I.1946 (A. R. Waterston); Wadi Makalan, 17°15'N., 45°45'E., 23.X.1946; Aden Protectorate: Aden, VI.1932 (M. C. Rant); Phala, 4800 ft., IX.1936 (B. F. Haythornthwaite); Al Huseini nr. Lahej, 450 ft., 26-29.XI.1937 (H. Scott & E. B. Britton); Sheikh Othman, 10 m. from Aden, 1.XI.1932 (M. C. Rant); Aden, V.1936; Beihan, 180 m. N. N. E. Aden, 4000 ft., VII.1936 (R. C. M. Darling); Hadramaut; «Hadramaut», 1894; N. W. Makalla, Limestone Mts., 3000 ft., XI.1935 (R. C. M. Darling); Yemen, Maidi, 16°22'N., 42°46'E., 22.II.1951, swarm; Yemen, Zaidiyah, 24.IV.1951, swarm; Khaukhar, 13°49'N., 43°14'E., 18.III.1951, swarm (L. A. Tillin) (Anti-Locust Research Centre). Oman: Muscat, 1898 (Dr. Jayakar) (Brit. Mus.).

SUEZ CANAL: 1876 (H. M. Parish) (Brit. Mus.). Probably an accidental, or even imported, specimen.

S. PERSIA: Hurmudar Bala, 27°20'N., 56°13'E., 28.I.1944, 1.II.1944 (H. S. Darling) (Brit. Mus.). Kuh-i-Ginau, 20 miles N. of Bandar Abbas, 20.IV.1950, 3 ♂♂, 9 ♀♀ (G. V. Popov) (Anti-Locust Research Centre).

TRIPOLITANIA: Corradini, 5.IV.1951 (K. M. Guichard).

DISTRIBUTION AND ECOLOGY

The distribution area of this subspecies occupies the eastern and south-eastern extension of the Saharo-Sahelian and Sahelian vegetation zones, which comprise Eritrea, and lower parts of Ethiopia and extend southwards through the Somalilands to the Turkana desert and the dry lowlands of eastern Kenya (a single record from Uganda, west of Victoria, is of interest). The subspecies occurs very commonly also on the other side of the Red Sea, in southwestern Arabia, and its area extends, presumably with some interruptions, northwards to Muscat and even across the Persian Gulf to southern Iran. A pair of specimens, from Tripolitania, referable to this subspecies by colouration of wings may represent only individual variation of sbsp. *melanorhodon* (see p. 21).

BIONOMICS

No data are available on the annual cycle of this subspecies and it may be expected to vary according to the rainfall regimes of the different areas. While it normally occurs singly, or in groups, on trees, swarms have been reported from British Somaliland, Yemen (including a swarm settled on mangrove in water) and Ethiopia. In the latter country, dense aggregations of hoppers, heavilly marked with black and of fledgling adults, have been observed by Mr. K. M. Guichard at the Garibaldi Pass, 4200 ft. The adults were of smaller size than the usual (see Table I), which may be due to altitude.

Anacridium wernerellum (Karny)

Text-figs. 3, 11, 20-23; Plates, Fig. 51.

1907. *Orthacanthacris wernerella*, Karny, Sitz. ber. Akad. Wiss. Wien, Abt. 1, 106: 305.
1910. *Orthacanthacris wernerella*, Kirby, Syn. Cat. Orth., 3: 444.
1923. *Anacridium moestum moestum* (partim), Uvarov (nec Serville), Ann. & Mag. Nat. Hist., (9) XI: 488.

♂. Median carina of pronotum slightly convex, comparatively strongly incised by transverse sulci. Prozona constricted; metazona weakly widened behind, slightly convex, with broadly rounded posterior margin; lower margin of lateral lobe oblique, irregularly recurved.

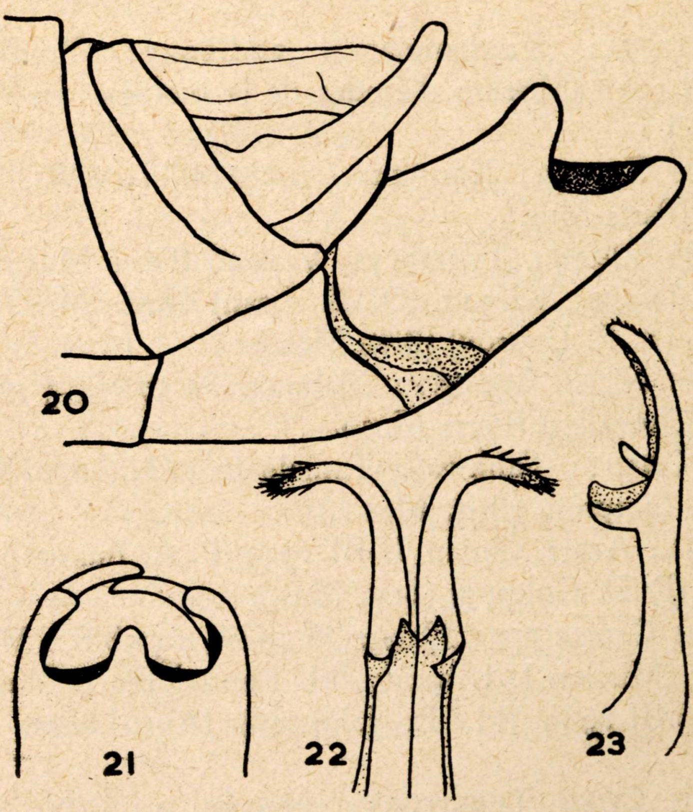
Prosternal tubercle compressed laterally, viewed in profile broad, with its apical part sloping forwards, apex obtuse.

Elytron long and comparatively narrow. Hind femur comparatively broad, ratio of length to width 4.1-4.5.

Subgenital plate, in profile, narrow with narrow elongated lobes; viewed from below, middle lobe long, narrow, tongue shaped; lateral lobes long, narrow, well separated from the middle lobe, with rounded apex. Cerci comparatively short and strongly incurved, do not approach the apex subgenital plate.

Aedeagus narrow, strongly chitinised, its apical lobes strongly curved and divergent.

Colouration brownish-grey; antennae black except the first basal segment; metazona of pronotum sometimes with sparse



Figs. 20-23.—*A. wernerellum*, male: 20, lateral view of abdominal end. 21, ventral view of subgenital plate. 22, end of aedeagus, frontal view. 23 do., lateral view.

light dots; elytron with indistinct dark spots. Basal disc of wing small, transparent, more or less intensively violet or dirty blue; fascia dark brown, sometimes black, very sharp and broad, covering the greater part of the wing, leaving colourless only the narrow external margin and the apical third of the wing. Hind tibia above and outside greyish, slightly violet, inside greyish-violet; external tibial spines on both sides and internal spines on the inside, in basal half pale, then with a red ring and almost black apex; internal spines outside bright red with black apex.

♀. As the male but larger. Ratio of length to width of the hind femur 4.5-4.8.

SPECIMENS EXAMINED

CAPE VERDE ISLANDS: St. Vincent, 1882 (Delaunay) (Paris Mus.)

MAURITANIA: Tindjanmaran, 29.I.1937; Tindjanmaran, Rosso, 30.I.1937 (Mission d'études de la biologie des Acridiens) (Paris Mus.).

FRENCH GUINEA: Kouroussa, 10°30'N., 10°0'W., 1901 (H. Pobeguia) (Paris Mus.).

FRENCH SUDAN: Tilembeya, V.1948 (Paris Mus.); Middle Niger, Diafarabe, V.1932 (O. B. Lean) (Brit. Mus.); Segou, 15.V.1949 (B. P. Uvarov) (Brit. Mus.).

FRENCH NIGER COLONY: Tahoua, 14°57'N., 5°16'E., 1.II. 1932 (A. Chevalier) (Paris Mus.).

GOLD COAST: Sankwalla-Tamale (9°22'N., 0°50'W.), XII. 1915 (J. J. Simpson) (Brit. Mus.).

NIGERIA: Azare, Gadau, II-III.1933 (P. A. Buxton); Kalkala, I-III.1933 (F. D. Golding) (Brit. Mus.).

FRENCH CAMEROUN: Natsari, 8°40'N., 13°58'E.; Mayo Lidi, II-III.1933 (Mission J. Lebaudy, H. Lhotte) (Paris Mus.); Lake Fianga, 26.III.1949 (H. B. Johnston) (Anti-Locust Research Centre).

FRENCH CHAD TERRITORY: Ngorru, 12°50'N., 16°30'E., 9.II.1949 (H. B. Johnston) (Anti-Locust Research Centre).

OUBANGHI-SHARI-CHAD: Moyen Chari, Fort Archambault, Bacaré ou Bonngoul, 1904 (Mission Dr. J. Decorse) (Paris Mus.).

ANGLO-EGYPTIAN SUDAN: Wad Medani, 6.I.1920; 13.I. 1930 (H. B. Johnston) (Brit. Mus.); Roseires, 3.II.1930 (H. B. Johnston); Mongalla, 5°10'N., 31°45'E., 4.XII.1924 (G. O. Whitehead); El Kineiza, Upper Nile, 1.II.1930 (H. B. Johnston); Seraya, Fung Prov., 1.II.1930; Torit, 6.X.1945.

ETHIOPIA: «Abyssinie», 1899 (Mission de Bonchamps Ch. Michel & M. Potter) (Paris Mus.).

BELGIAN CONGO: Lake Albert, Ishwa, IX,1934; Mahagi-Port, X.1934. Kagera: Gahinga, Ruanda, 29.IV.1937 (H. J. Bredo); Tshipama, Kanda-Kanda, X-XI.1935 (J. Drion); S. E. Katanga, Ngaye, XI-XII.1931 (R. P. Claquin); Katanga, Lu-

kafu, 6-22.XII.1930 (G. F. de Witte); Boma, 5°51'S., 13°03'E., XI.1928 (M-me. J. Tinant); Kibali-Ituri, Kilo, 1930 (G. du Soliel); Kivu, Luvungi, 8.XII.1932 (L. Burgeon) (Musée du Congo Belge). Mahagi Port, 28.IX.1935 (H. B. Johnston) (Brit. Mus.).

UGANDA: Butiaba, IX.1935 (H. B. Johnston); Msozi, I.1903 (Delme Radcliffe) (Brit. Mus.).

KENYA: Turkana, Kahuma, 1.V.1934, Ruiru (F. J. Gedye); Nairobi, 5450 ft., II.1931 (F. J. Gedye); Emali Range, Sultan Hamud, 4900-5900 ft. (Brit. Mus.).

TANGANYIKA TERRITORY: Old Shinyanga, 9.VI.1935; 12-30.XII.1936; 4.I.1937; IV.1937; 4.IX-1937; 7-19.XII. 1946; 16.I.1947; 11.III.1947; 9-11.VI.1949 (E. Burtt); Kilosa (6°48'S., 37°2'E.), 4.IX.1926; VII.1926. Morogoro, 20-23.X. 1920; Uluguru Mts., II.1927 (N. C. E. Miller); Ikuu, Katisunga area, Rukwa valley, II-III.1950 (H. Bredo); Rukwa, V.1950 (D. V. Fitzgerald); Tinde, 1946 (E. Burtt), Tendaguru, 15.IX.1924 (W. E. Cutler) (Brit. Mus.).

ZANZIBAR: «Zanzibar», VII.1893 (Philip de la Garde) (Brit. Mus.).

N. RHODESIA: Chisorwe, IV-VI.1928 (M. Burr) (Brit. Mus.).

MOZAMBIQUE: Vila Pery, XI.1928 (P. Lesne) (Paris Mus.).

NYASALAND: Zomba, 28.V.1941 (at light), Pt. Herald, 500 ft., 19.VII.1935; 12.IX.1935 (C. Smee) (Brit. Mus.).

TAXONOMIC NOTES

This species, described by Karny from Gondokoro, North Uganda, has been confused and wrongly synonymised with the South African *A. moestum* (Serville) in Uvarov's (1923) revision of the genus, where it was regarded as only subspecifically distinct from *A. melanorhodon* (Walker). This view was accepted by later authors, e. g. Johnston (1932), Rehn (1944) and Chapman (1945) and it caused the latter author to misrepresent its distribution (see p. 21). Golding (1948) was the first to record in print a suggestion made by his colleague A. M. Gwynn that *melanorhodon* and «*moestum*» (under which name he meant *wernerellum* as we can confirm from specimens) are probably

two distinct species. In fact, the male genitalia of *melanorhodon* (Figs. 14-17) and *wernerellum* (Figs. 20-23) are so distinct that there can be no doubt as to their specific difference. On the other hand, while the true *moestum* is similar to *wernerellum* in wing colouration, it differs strikingly not only in the male genitalia (Figs. 24-27), but also in the shape of the hind femur (Figs. 11, 12).

A. wernerellum varies somewhat in the general body size, specimens from the hilly parts of Kenya being particularly small (see Table, p. 15), but otherwise typical. The wing fascia, which is always very wide, simetimes expands to the extent of covering almost the whole wing, except the base and the apical lobe. Wings acquire deep mauve or purple colour at sexual maturation.

Distribution and ecology

In Africa north of the Equator the distribution area of this species overlaps partly that populated by the two races of *A. melanorhodon*, but it is clearly more southerly and extends over the whole Sudanese vegetation zone, that is the less arid savannas, reaching, through East Africa, as far southwards as Northern Rhodesia, Nyasaland and Mozambique and extending into drier parts of the Belgian Congo. Some of Rehn's (1944) records of *A. moestum moestum* from South Africa (in particular, that from Zululand), probably, refer to this species, as he found his South African material inseparable from a female the Gold Coast received from the British Museum with the name *A. moestum* as understood before the present revision. The female in question was undoubtedly *A. wernerellum*.

Bionomics

Evidence collected by Golding (1948) suggests that in Nigeria there is one annual generation, but Dr. Eric Burtt at Shinyanga, Tanganyika Territory observed two generations, with an over-

lapping in the adult period (unpublished data, which Dr. Burtt kindly permitted us to quote). Golding recorded it as found principally on trees and on cotton, and Dr. Burtt observed both hoppers and adults also on trees, particularly, on *Acacia senegal*. Gregarious tendencies have been recorded by Golding, who mentioned two small swarms, as well as a sudden increase in a local adult population and capture of individuals at light, suggesting night migratory flights in the dry season.

Anacridium moestum (Serville)

Text-figs. 5, 12,24-27; Plates, Fig. 52.

1839. *Acridium moestum*, Serville, Ins. Orth.: 654.
1910. *Orthacanthacris moesta*, Kirby, Syn. Cat. Orth., 3: 444.
1923. *Anacridium moestum moestum* (partim), Uvarov, Ann. & Mag. Nat. Hist., (9) XI: 488.
1942. *Anacridium moestum moestum*, Rehn, Notulae Nat., 110: 2.

♂. Pronotum comparatively slender; median carina, in profile, slightly convex, comparatively deeply incised by transverse sulci; prozona weakly constricted, convex, its anterior margin strongly projecting forwards; metazona scarcely convex, widened behind, with broadly rounded posterior margin; lower margin of the lateral lobe oblique, rounded.

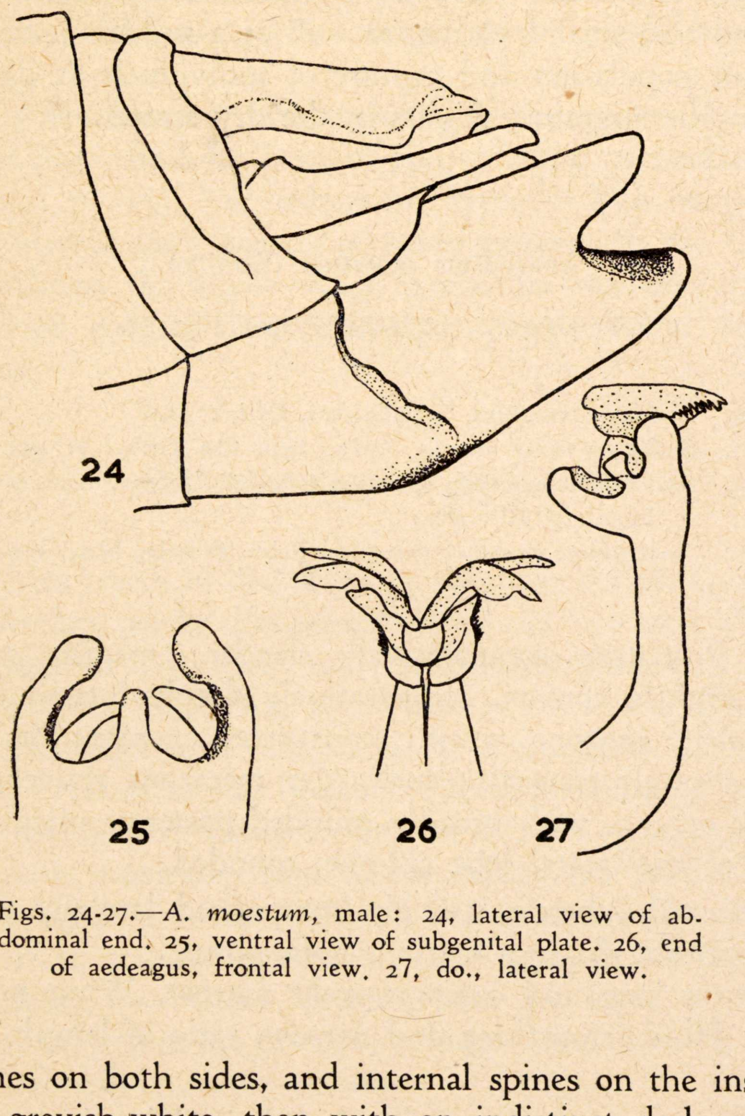
Prosternal tubercle strongly compressed laterally, its apical part in profile, sloping in front, apex obtuse.

Elytron long and comparatively narrow. Wing moderately narrow. Hind femur long and narrow, ratio of length to width 4.8-5.1.

Subgenital plate, in profile, broad, its lobes long and comparatively narrow; viewed from below middle lobe narrow, tongue shaped, rounded and slightly widened at the apex; lateral lobe long, its apex widened and rounded. Cercus long, weakly incurved. Aedeagus with broad leaf-like, divergent, weakly chitinised apical lobes and robust basal part.

Colouration greyish-brown. Antenna black, except light first and second basal segments.

Elytron with indistinct dark spots. Basal disc of wing light yellowish or colourless, with an almost black, sharp, and rather broad fascia with basal ray. Hind tibia pinkish-grey; external



Figs. 24-27.—A. *moestum*, male: 24, lateral view of abdominal end. 25, ventral view of subgenital plate. 26, end of aedeagus, frontal view. 27, do., lateral view.

tibial spines on both sides, and internal spines on the inside at the base, greyish-white, then with an indistinct dark-red ring and almost black apex; outside of the internal spines dark-red with the apex black.

♀. As the male but much larger. Ratio of length to width of the hind femur 5.2-5.7.

Specimens examined

S. Rhodesia: Norton, VIII.1934 (S. Rhodesia Dept. of Agric.).

Bechuanaland: Ghanzi, Mongalatsila, 21°31'S., 21°37'E., 21.II.1925 (J. Maurice) (Brit. Mus.); Lake Ngami, 16.IX.1948 (P. J. Strauss) (Univ. Pretoria).

S. Africa: Pretoria, 17.X.1906, Bloksberg, Johannesburg (C. H. Pead); Transvaal (Brit. Mus.); De Aar, 29.IV.1937 (Univ. Pretoria); Fairy Glen, 29.VI.1947; Lothlegthlana, 9.IX. 1948 (P. J. Strauss) (Pretoria Mus.).

S. W. Africa: Sissekab, 19°30'S., 17°25'E., 14.XI.1933 (K. Jordan). Omaruru, 1921; Satansplatz, 1300 m., 25°00'S., 17°35'E., 17.XIII.1933 (K. Jordan) (Brit. Mus.).

Systematic notes

As already stated (p. 29) this species has been confused with *A. wernerellum*, but it has very distinct male genitalia, and differs from *wernerellum* in both sexes also in the structure of the hind femur (compare Figs. 11 and 12).

Distribution

Records given by Rehn (1944) refering to Bechuanaland, Transvaal, Zululand and the Cape Province may not all be of this species (see p. 29). It will be seen (Map p. 10) that the species occurs in the drier parts of South Africa penetrating northward to Southern Rhodesia. The type locality was given by Serville as «pays de Massilikats», which is the present day Matabeleland, Southern Rhodesia.

Bionomics

Nothing is known of the habits of this species, but according to Lounsbury (1924), it occasionally causes damage to fruit trees, particularly in the Orange Free State.

Anacridium eximimum (Sjöstedt)

Text-fig. 9; Plates, Fig. 54.

1918. *Orthacanthacris eximia,* Sjöstedt, Arkiv. Zool., XII, No. 1, p. 2, fig. 2.

Re-description of the type.

♀ (Type). Median carina of pronotum, in profile, convex, strongly incised by transverse sulci; prozona weakly constricted, anterior margin projects forward; disc of metazona slightly convex in the anterior part and slightly concave in the posterior, its posterior margin broadly rounded and slightly turned upwards; lower margin of the lateral lobe oblique, almost straight.

Prosternal tubercle compressed laterally, its apex obtuse.

Elytron long and broad; projects far beyond the apex of the abdomen. Wing moderately narrow, long. Hind femur long and broad, ratio of length to width 4.7.

Colouration ochraceous-brown. Antenna light. Elytron with dark indistinct spots. Basal disc of wing yellowish (?) (specimen from alcohol), with brownish moderately broad fascia and basal ray. Hind tibia light ochraceous-brown (?); tibial spines with light bases and dark apices.

Taxonomic notes

A. eximium was described from Accra (Gold Coast) from a single female. Although we examined the type, it is difficult to decide on its affinities without the male, but we consider it wiser to regard it as an independent species and not a synonym of *A. moestum* as it has been regarded in the past (Uvarov, 1925; Rehn, 1944).

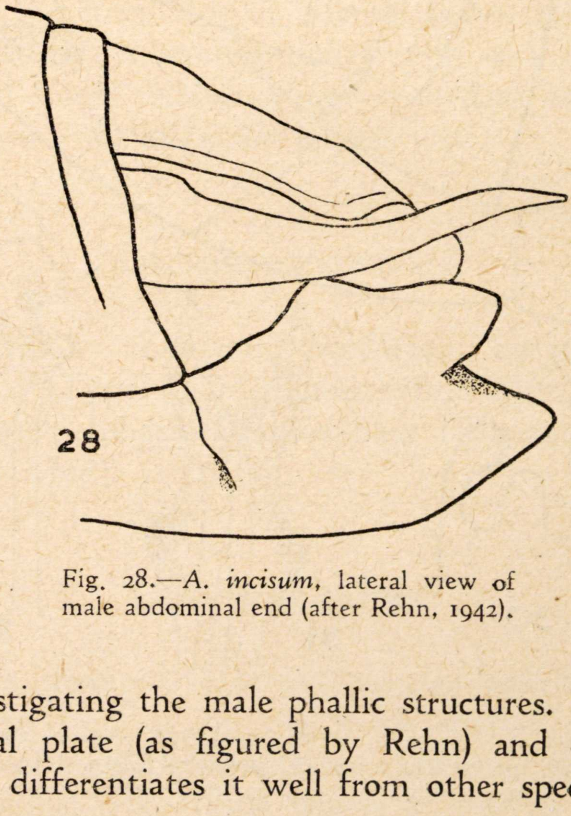
Anacridium incisum Rehn.

Text-fig. 28; Plates, Fig. 55.

1942. *Anacridium incisum*, Rehn., Not. Nat., Philadelphia, 110: 1.

This species was described from South Africa (Kasouga, Bathurst Distr., Cape Province, 33°30′S., 26°50′E.).

It is difficult to decide on the relationship of this species



28

Fig. 28.—*A. incisum*, lateral view of male abdominal end (after Rehn, 1942).

without investigating the male phallic structures. The shape of the subgenital plate (as figured by Rehn) and comparatively short elytron differentiates it well from other species.

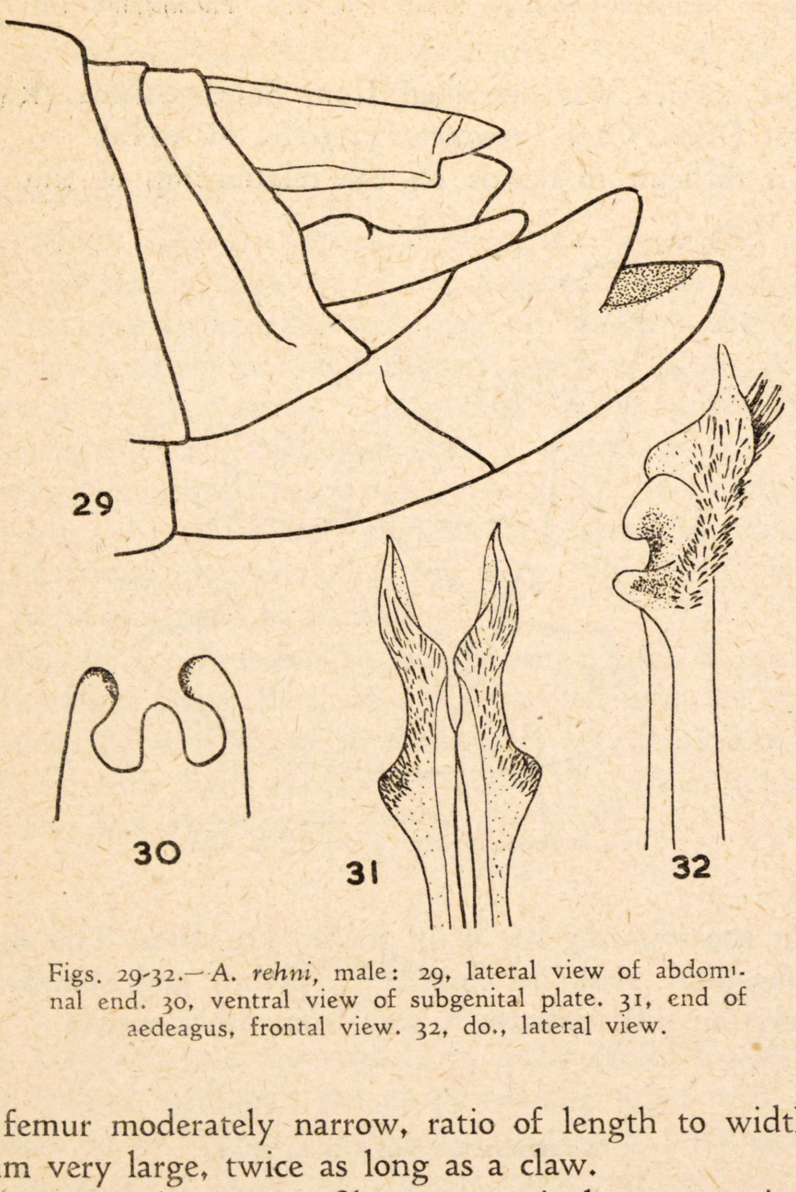
Anacridium rehni Dirsh, sp. n.

Text-figs. 10, 29-32. Plates, Fig. 53.

♂ Type). Median carina of pronotum well raised, weakly convex in profile and moderately incised by transverse sulci; prozona slightly compressed; metazona moderately widened behind, its posterior margin broadly rounded; lower margin of the lateral lobe oblique and scarcely sinuate.

Prosternal tubercle at the base compressed laterally, in the apical portion subcylindrical, with obtuse conical apex.

Elytron moderately produced beyond the apex of the abdomen, comparatively short. Wing comparatively short and broad.



29

30 31 32

Figs. 29-32.—*A. rehni*, male: 29, lateral view of abdominal end. 30, ventral view of subgenital plate. 31, end of aedeagus, frontal view. 32, do., lateral view.

Hind femur moderately narrow, ratio of length to width 4.9. Arolium very large, twice as long as a claw.

Subgenital plate, in profile, comparatively narrow, its lobes moderately long and broad; viewed from below, median lobe elongated, finger-shaped with rounded apex; lateral lobe moderately long with rounded apices. Cercus short and broad, weakly incurved, its apex produced slightly beyond the middle of the subgenital plate. Aedeagus with acute and slightly

divergent apical lobes, which are weakly chitinised and with solid basal part.

Colouration light brown. Antenna brownish. Elytron with more or less distinct dark spots. Basal disc of wing light greenish-yellow with a weak infumate fascia which is rather near the external margin of the wing; apical part colourless; venation and reticulation in the basal disc greenish-yellow, in the rest dark.

Hind tibia above and inside violet-grey, external tibial spines on both sides and inner side of internal spines at the base pale yellowish, then diffuse raddish-orange with dark apex; outside of the internal spines reddish-orange with dark apex.

♀ (Paratype). As male, but larger.

Specimens examined

South Africa: Zululand, Sordwana, 27°36′S., 32°5′E., 20.V.1946, 1 ♂ (Type) (S. H. Staden) (Brit. Mus.).

Mozambique: Inhaca, Delagoa Bay, 1.II.1951, 1 ♀ (B. I. Balinsky) (Brit. Mus.).

Taxonomic notes

This species is nearest to *A. incisum* also from South Africa, but well differs from it by the much shorter cercus, more elongated lobes of the subgenital plate, which is long and narrow, and by the distinct wing fascia which is close to the external margin of the wing.

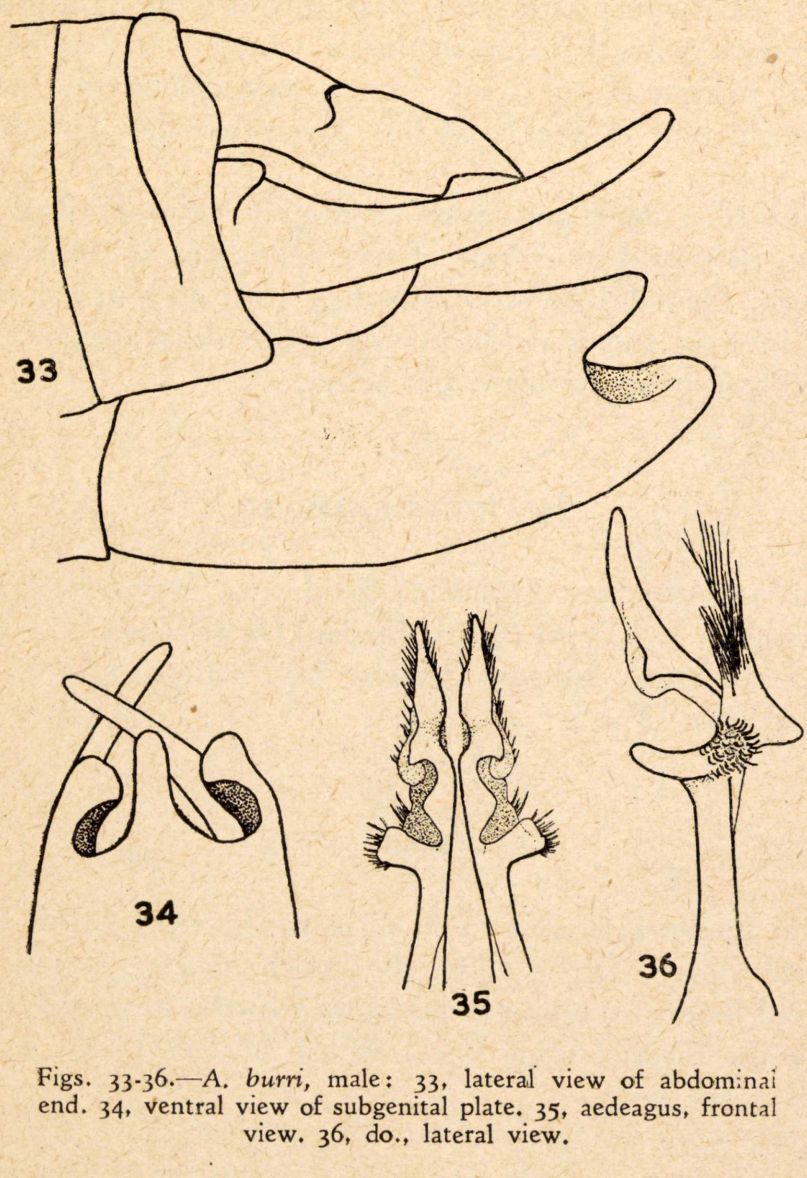
Anacridium burri Dirsh, sp. n.

Text-figs. 4, 13, 33-36; Plates, Fig. 57.

♂ (Type). Of medium size, slender.

Pronotum slender, median carina, in profile almost straight, strongly raised, moderately incised by transverse sulci; prozona

slightly constricted, its anterior margin projects forwards; metazona widened backwards, its posterior margin broadly



Figs. 33-36.—*A. burri*, male: 33, lateral view of abdominal end. 34, ventral view of subgenital plate. 35, aedeagus, frontal view. 36, do., lateral view.

obtusangulate, with the apex rounded; lower margin of the lateral lobe irregularly curved.

Prosternal tubercle compressed laterally, sloping backwards, with rounded apex.

Elytron long, narrow, projects far beyond the apex of the abdomen. Wing long, very narrow, apex acute. Hind femur

long and very narrow, ratio of length to width 6.1. Hind tibia above with dense, long hairs.

Subgenital plate, in profile, long, narrow, with broad lower and narrow and shorter upper lobe; viewed from below, middle lobe long, longer than lateral lobes, narrow tongue-shaped with rounded apex; lateral lobes broad, rounded at the apex. Cerci long, weakly incurved and projecting beyond the apex of subgenital plate. Aedeagus with long, strongly chitinised, apical lobes, with bunches of bristles.

Colouration light brown. Antenna brown. Pronotum with dark spots, and in the metazona with scattered light dots. Elytron with numerous irregular dark spots.

Basal disc of wing light greenish-yellow with short, narrow, infumate fascia reaching to the middle of the wing. Hind tibia dirty grey; external tibial spines on both sides and internal spines on the inner side at the base dirty white, then with a red diffused ring and dark apex; outside of the internal spines, red with dark apex.

♀ (Paratype). As the male but larger. Ratio of length to width of the hind femur 6.6.

Specimens examined

N. Rhodesia: Chisorwe, 15°0′S., 28°0′E., IV-VI.1928, 1 ♂ (Type) (M. Burr) (Brit. Mus.). Haute Zambeze, Lealui, 1915, 1 ♀ (V. Ellenberger) (Paris Mus.).

Angola: Huambo, Nova Lisboa, 12°48′S., 15°42′E., 1934, 1 ♀ (J. Pimental) (Brit. Mus.).

Systematic notes

This species differs sharply from all others by the phallic structure, narrow elytron and wing and distinctly raised median carina of pronotum, as well as by the hairy tibia, a feature characteristic of the related genus *Orthacanthacris*.

Anacridium aegyptium (Linnaeus)

Text-figs. 7, 37-40; Plates, Fig. 59.

1764. *Gryllus Locusta aegyptius,* Linnaeus, Mus. Ludov. Ulr.: 131.
1781. *Gryllus lineola,* Fabricius, Spec. Ins. I: 365, n. 20.
1815. *Gryllus nubecula,* Thunberg, Mém. Acad. Pétersb., 5: 238.
1824. *Gryllus rubecula,* Thunberg., Mém. Acad. Pétersb., 9: 426.
1836. *Podisma appulum,* Costa, Faun. Nap. Orth., 44, n. 1, pl. 4, f. 3, 4.
1836. *Podisma campanum,* Costa, *l. c.,* 47, n. 3, pl. 4, f. 5.
1870. *Acridium indecisum,* Walker, Cat. Derm. Salt., 3: 585.
1870. *Acridium albidiferum,* Walker, *l. c.,* 4: 627.
1910. *Orthacanthacris aegyptia,* Kirby, Syn. Cat. Orth., 3: 444.
1923. *Anacridium aegyptium,* Uvarov, Ann. & Mag. Nat. Hist., (9) 11: 487.
1943. *Flamiruizia stuardoi,* Liebermann, Rev. Soc. ent. Argentina, 11: 401.
1943. *Anacridium aegyptium* (= *Flamiruizia stuardoi*), Ogloblin, Notas Mus. La Plata, 8: 147.
1951. *Anacridium stuardoi,* Liebermann, Rev. Soc. ent. Argentina, 15: 140 (footnote).

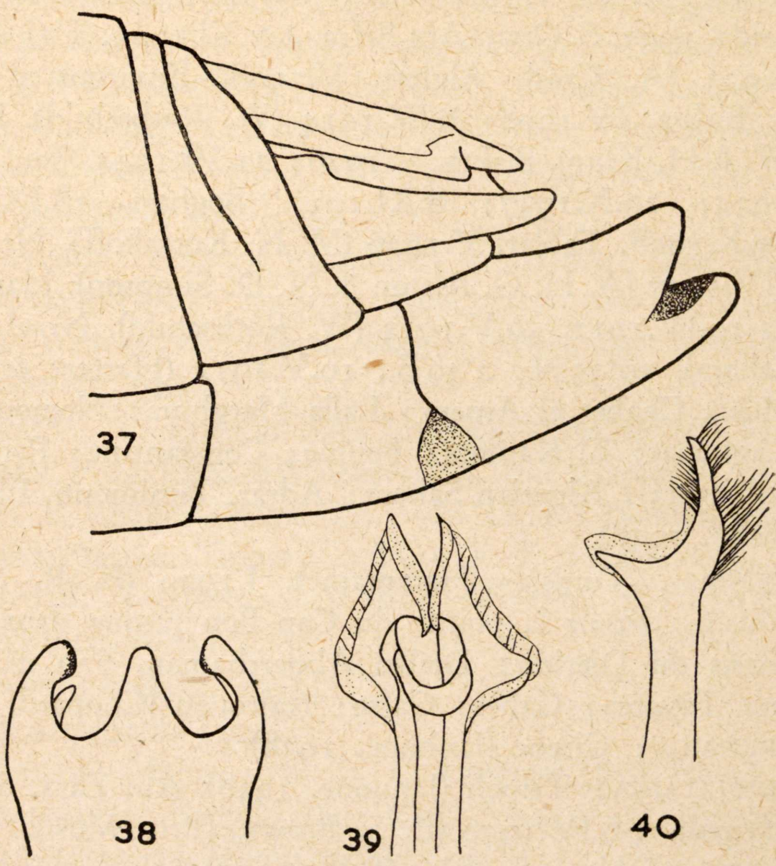
♂. Pronotum robust; median carina of pronotum strongly convex in profile, and comparatively deeply incised by transverse sulci; prozona constricted, convex; metazona moderately widened, its posterior margin rectangular, with acute apex; lower margin of lateral lobe oblique, slightly curved, almost straight.

Prosternal tubercle subcylindrical, slightly compressed at the base and obtuse at the apex. Elytron comparatively short and broad, moderately projecting beyond the apex of the abdomen. Wing comparatively wide and little narrowed to the apex. Hind femur long and wide, ratio of length to width 4.4-4.8.

Subgenital plate, in profile, narrow with narrow lower and broad upper lobes, viewed from below, middle lobe elongate, tongue-shaped, with rounded apex; lateral lobe long, narrow, its apex rounded, distant from the middle lobe. Cercus short, weakly incurved, scarcely extending beyond the middle of the subgenital plate. Aedeagus with short, strongly chitinised, widened lobes.

Colouration varying from light yellow-ochraceous to dark brownish-grey. Antenna dark, except first 3-6 light segments. Elytron with indistinct small, dark spots or without them. Basal

disc of wing very pale violet, dirty yellowish, or light grey, with a broad and diffuse brown fascia. Hind tibia above and inside



Figs. 37-40.—*A. aegyptium*, male: 37, lateral view of abdominal end. 38, ventral view of subgenital plate. 39, aedeagus frontal view. 40, do., lateral view.

bluish-grey; all tibial spines at the base pale, apically almost black.

♀. As the male but larger. Ratio of length to width of the hind femur 4.5-5.0.

SPECIMENS EXAMINED AND ADDITIONAL LITERATURE RECORDS

MADEIRA (Uvarov, 1923).

MOROCCO: Tangier (B. B. Woodwards). Tetuán, Azrou, 1400 m., 21.V.1924 (E. Hartert) (Brit. Mus.). Melilla, Tánger,

Marrakech, El Glaui, Taza Maarif, Mamora, Tabat, Morocco, Saharien: Tatta (Chopard, 1943).

ALGERIA: Oran, 8-18.IV.1913 (W. Rothschild). Mascara, 1922, Saida, 1923, S. Oran, Ain Sefra, 4-7.VI.1923, Tizi Ouzou, 19.XII.1923 (A. Cros). Algiers, V.1908. Environs d'Alger, V.1912. Biskra, IV.1908; 8.IV.1914 (W. Rothschild). Biskra, 1907 (W. J. H. King). Biskra, V.1926; 21.VI.1934. Bou-Saada, 18.VI.1934; 10.X.1937; 8.XI.1937. Boghari, 28.IX.1937. Djelfa, 7.X.1938. Tablat, V.1926 (M. N. Korsakoff). Nr. Adecar, 26.IV.1937 (A. H. G. Alston & N. D. Simpson). Hammam Rirha, 2-10.IV.1912, 30.V.1913 (W. Rothschild). N. el Golea (Alg. Sahara), 30°35'N., 2°49'E., 10.V.1912 (Hartert & Hilg) (Brit. Mus.). Chabet el Ameur; Lalla Marghnia; Nemours (Finot); Laghouat; El Kantara; Bougie; Constantine; Perrégaux (Chopard, 1943); Algerian Sahara: Adrar, Timimoun, El Golea (Volkonsky, 1938).

TUNISIA: «Tunisia» Hammamet, I.1929 (E. R. Speyer) (Brit. Mus.), «depuis la pointe du Cap Bon jusque dans l'Arar et les oasis du Djerid»; Djebel Abderrhaman, 630 m.; Ain Draham; Tavarca; Gabès; Gafsa; Kairouan (Chopard, 1943).

CYRENAICA: Cirene (Jannone, 1938).

TRIPOLITANIA: Tripoli (Jannone, 1938). Ain Zara, 6 m. S. E. of Tripoli, 3-6.IV.1946 (E. S. Brown) (Brit. Mus.).

FEZZAN: Sebha; Serdeles (Salfi, 1935).

EGYPT: Wadi Natrun, III.1910 (M. J. Vicoll). Wadi el Natwar, 2.III.1903 (N. C. Rothschild). Helwan, 26.II.1930; 15.III.1930; 9-22.XI.1930; 3-5.I.1931; 17-25.II.1931 (Dr. W. Roszkowski). Wadi el Aguss, 22.XI.1930. Delta Barrage (W. Draper). Fayid, II. 1945 (F. J. Dunkley). Suez, 1901 (F. W. Christian). Siwa, IV-V-VII-VIII.1935 (J. Omer-Cooper) (Brit. Mus.). «All over Egypt» (Zoheiry, 1937).

PORTUGAL: Oporto, 1908, Cintra, I.1896 (Jerburg). Estoril, 26.III.1896 (Oldfield Thomas). Cascaes, 17.IV.1922 (J. A. Humphreys) (Brit. Mus.).

SPAIN: Málaga. Moratalla, 15-18.IX.1935 (M. Burr) (Brit. Mus.).

MAJORCA: Inca, 24.III.1900 (Brit. Mus.).

MINORCA: San Cristóbal, 6-14.IV.1900 (O. Thomas & R. H. Pocock) (Brit. Mus.).

FRANCE: Hyères, 7-16.V.1921 (K. J. Blair). Cannes, 1911. Alpes Maritimes, Cagnes, VIII-XI.1924. Mentone, 1893. St. Cerbère, 1900 (O. Thomas & R. Pocock). Var, Bagnols, X.1946 (M. Korsakoff) (Brit. Mus.). Banyuls, Pyr. Orientales, 7-10.IV. 1945 (G. Remaudière) (Paris Mus.). Gironde, Lot-et-Garonne, Haute-Garonne, Pyrénées-Orientales, Aude, Hérault, Gard, Bouches-du-Rhône, Vaucluse, Drôme, Basses-Alpes, Var. Hautes-Alpes (Chopard, 1922).

CORSICA: Foce di Vizzanova, 5.VII.1893 (Brit. Mus.).

SWITZERLAND: Lugano, 19.XI.1931 (G. H. Grant) (Brit. Mus.). Willeneuve. Tessin, Bremi. Monte Bre. Chiasso, Misox (Fruhstorfer, 1921).

ITALY: L. Lugano, San Mamete, Valtolda (G. H. Grant). Tuscany, Prov. Lago di Massaciucolli, near Viareggio, 18.IX.1937 (Dr. F. E. Zeuner). Rome (Dr. Vito Zanon). Naples, 27.VI.1899 (Hamlin-Harris). Taranto, 1.V.1918 (E. Hargreaves). Arquato, 9.IX.1918. Tressino, 12.II.1919. Vicenza, II-III.1919 (E. B. Ashby) (Brit. Mus.).

SARDINIA (Salfi, 1930).

SICILY (Salfi, 1930).

MALTA: Malta, 1924 (H. C. Harford) (Brit. Mus.).

DALMATIA: Budua, 1897 (Brit. Mus.).

BULGARIA (Nedelkov, 1907).

MACEDONIA: Struma Valley, Kerkeni, 25.VI.1935 (P. A. Buxton). Struma Valley (H. Turtle). Lembet, V.1916 (M. Burr). Nr. Salonica, VII-VIII.1917 (J. Waterston) (Brit. Mus.).

GREECE: Athens, IV.1901 (A. S. Woodward). Attica, 1891 (Merlin Coll.). Xanthos (Brit. Mus.).

CRETE: Near Kanea, 9.III.1904 (D. M. A. Bate) (Brit. Mus.).

CYPRUS: Limassol, VI.1920 (R. L. Cheverton). Limassol, 3.IV.1919, Mt. Troodos, 18.VI.1935 (G. Mavromoustakis) (Brit. Mus.).

TURKEY: Gallipolli, 1.I-10.VIII.1923 (W. M. J. Martin). Island of Halki off Constantinople, VII.1929 (J. H. Edwards). Mugla vilayet, Fetiye, S. W. Turkey, 28-VII.1947 (M. Burr). Alachehir, 1930. Smyrna, 1930 (Sureya Bey). Marash, 1931 (E. Cold) (Brit. Mus.). Artvin (Uvarov, *in litt.*).

SYRIA: Deir-es- Zor, 27.III.1945 (K. P. Whitehorn); 23.V.

1946 (E. S. Brown). Damascus, VI.1945; 1.VIII.1945, Rosh, Pinna, 20.IV.1945 (F. N. Norris) (Brit. Mus.).

LEBANON: Anjar, 12.I.1945 (K. P. Whitehorn). Amium, 10.VIII.1944 (H. B. Cott) (Brit. Mus.).

ISRAEL: Galilee, 1863. Jabgha, Galilee, 15-17XI.1935. Degania, 6.IV.1945. Capernaum, 7.IV.1945. Haifa, 25.V.1921 (P. A. Buxton) (Brit. Mus.).

JORDAN: Nr. Galt, 26-VII-1945. Tafileh, 27.X.1942 (W. H. R. Lumsden). Amman (H. St. J. B. Philby) (Brit. Mus.).

ARABIA: Sakaka, 19.II.1935 (H. St. J. B. Philby) (Brit. Mus.).

IRAQ: Mesopotamia, 30.X.1917; 27.XI.1917; 18.VII.1918 (P. A. Buxton). Baghdad, 1923 (R. W. G. Hingston). Fao. 1840 (Brit. Mus.).

PERSIAN GULF: Bahrein Is., 7.X.1935 (J. Fernández).

PERSIA: Abadan, IV.1934 (S. V. Pill) (Brit. Mus.). Bushire, 7-12.V.1927 (M. M. Siazov). Haft-Kel, XI.1918 (S. V. Pill). Enzely (Caspian Coast), 10.IX.1919 (P. A. Buxton) Astrabad (Uvarov, *in litt.*). Prov. Baluchistan, Surah, IV.1919 (Vakhshouri) (Brit. Mus.). Bone Kuh, 1.IX.1948. Garane Sar, E. Tehran, 5.VIII.1948. Mahmudhieh, Tehran, VIII-XII.1948. Hablah Rud, Tehran Steppe, 3-4.IX.1948 (P. Aellen) (Basel Mus.). Kasr-i-Shirin, Kurdistan (Uvarov, 1916. Khash-Iran-Shahr, 16.V.1948 (P. Aellen) (Basel Mus.).

AFGHANISTAN: West Afghanistan (Bey-Bienko, 1949).

BALUCHISTAN: Pishin, IV.1933 (Lt. Col. C. G. Nurse). Quetta, 29.III.1938 (Nezeer) (Brit. Mus.).

EUROPEAN RUSSIA: Crimea (Fedorov, 1927). Daghestan; lower Volga (Tarbinsky, 1940).

TRANSCAUCASIA: Tiflis, 13.IV.1906 (E. König) (Brit. Mus.). Karaiazy; El-Tshimar; Aresh; Geok-Tapa; Shakh-Tshinar; Karaduli; Alexandrovka; Kirovobad. Nigri (39°00'N., 93°65'E.). Daridag (35°15'N., 93°35'E.), Erivan, Allaverdy (Savenko, 1941). Eldar; Dzhevansir; Shusha, Karjagin; Alpaut; Nakhichevan, Shamkhor, Kirovabad; Elenendorf; Djafarkhan; Kosmaliany; Altan (Tarbinsky, 1940).

RUSSIAN MIDDLE ASIA: Turkestan Meridionalis, 1881 (Capus Bonvalot). Prov. Ferghana, 400-600 m., 1914 (L. Gain) (Paris Mus.).

Taxonomic notes

This species is stable in its morphological characters, but varies in the general colouration from light grey to dark brown and blackish-brown; wing fascia also varies somewhat in its width and intensity. The basal part of the wing is sometimes very light purplish, which may be connected with sexual maturation.

In a large series from the whole vast distribution area of this species some variation in size is noticeable, specimens from Southern Europe and Caucasus being smaller than the north African ones. This may be connected with the larger number of hopper instars in the more southern areas, reflected also in the number of eye-stripes (see below) as established by Volkonsky (1938).

Distribution

This species presents one of the best examples of the type of distribution usually described as Mediterranean. Its African occurrence is restricted to the coastal lowlands and dry hilly areas of North Africa, and to oases of northern Sahara where it may have been introduced (see below). Its absence from the Canary Islands is noteworthy, particularly because it occurs in Madeira. In Europe, apart from the Mediterranean peninsulas, the species occurs only in Mediterranean France, some specially favoured valleys in southern Switzerland, and in Crimea and Caucasus; its northernmost and somewhat isolated occurrence in European Russia is on the lower Volga (Astrakhan). In Western Asia, *A. aegyptium* is found in the coastal and lowland areas as far as northern Iran, Persian Gulf and Iranian Baluchistan; its occurrence in Afghanistan and in the hills of Baluchistan (Quetta) is of special interest since it overlaps there with *A. rubrispinum* (see p. 51). Records from Russian Central Asia available to us are insufficiently detailed, and it is not impossible that some of them may refer to *A. rubrispinum*.

There also in literature numerous records of occurrence of *A. aegyptium* in central and northern Europe as well as in the

British Isles, but they all must refer to individuals imported alive with fruit and vegetables from Mediterranean countries. This happens mostly in winter, when hibernating adults enter baskets and boxes in which vegetables and fruit are packed and emerge on arrival to the shop or market. In recent years, when fruit and green vegetables began to be brought to northern countries by air, individuals of *A. aegyptium* are found very frequently in the British Isles in winter, and they are often reported in the daily press as locusts.

ECOLOGY

Considering that *A. aegyptium* is the largest European Acridid and not uncommon in the southern countries, remarkably little has been published on its ecology. Grassé (1922) merely states that this species «ne semble pas avoir un habitat bien determiné», but adds that adults are particularly frequent on trees and in vineyards. Krauss (1878) recorded that in Istria it is found in coastal lowlands and on hillsides in scrub forests, particularly those of *Quercus pubescens*. De Lépiney & Mimeur (1932) quote a number of «host plants», mostly fruit trees, of this insect, but merely say that it is very common in the lowlands of Morocco. Maria Volkonsky (1943) records it as common in orchards, on high trees, brambles and among reeds in the coastal zone of Algeria, while in the Saharan oases it lives on rose bushes and on vines, which suggests that its existence in the oases is connected with cultivation and that it may have been introduced there by man.

BIONOMICS

ANNUAL CYCLE.—Observations by Fabre (1899) who erroneously called this species «*Pachytylus cinerascens*», and by Grassé (1922) in Mediterranean France, by Zoheiry (1937) in Egypt and by Volkonsky (1937b) in Algeria have established that the normal cycle of *A. aegyptium* comprises one generation in a year, with the adults hibernating in sexually immature state. Grassé failed to induce sexual maturation in hibernating indi-

viduals by high temperature and concluded that hibernation is essential for sexual maturation, but Volkonsky (*l. c.*) obtained, in heated cages, two full generations within a year, without any imaginal diapause; Colombo (1951) in Italy has recently confirmed that females kept at a constant temperature of 30°C have no diapause, or a very short one; and Mohammed Hussein in Egypt obtained oviposition by 28-day old females kept at 28-35°C (personal communication). Incidental hibernation of late instar hoppers in southern France was recorded by Grassé (*l. c.*).

Eggs are laid from April to June, in curved cylindrical egg-pods, 90-95 mm long, with thin outer covering and a long upper spongy portion. Up to three egg-pods may be laid by a female, and the number of eggs in a pod varies from 30-199 (the maximum figure was recorded by Zoheiry, *l.* c.); according to Fedorov (*l. c.*), the first pod laid by a female contains 120-160 eggs, the second 80-100, and the third 30-60. Successfull incubation requires moisture in the soil (Maria Volkonsky, 1943) and it lasts 31-55 days in nature (Zoheiry); Volkonsky (1937) states that eggs incubated at 29°C hatched in 20-45 days. Hopper development in nature requires, on the average, 42-55 days (Volkonsky, *l. c.*). The number of hopper instars was given by Zoheiry as five, but in Volkonsky's experiments females passed through six instars and males through five; this was reflected in the number of dark stripes of the compound eye which was most frequently seven in females and six in males. Moreover, individuals from the northern range of the distribution area (Mediterranean France) had fewer (6-7) eye stripes than those from the Saharan oases (7-8); this suggests an increase in the number of hopper instars in a hotter climate, *i. e.* a reverse of what is known for other Acrididae (Volkonsky, 1938, 1938a) and experimental confirmation of Volkonsky's observations is desirable. Volkonsky has also recorded that rearing hoppers in crowded conditions led to a reduction in the number of stripes, as it does in *Schistocerca gregaria* (Forsk).

Sexual maturation of adult males is accomplished fairly rapidly and males in nature have fully developed sperm, in a spermatophore, by October (Grassé, 1922). Copulation is frequently observed during the autumn, although female gonads remain undeveloped until next spring. There are no recorded

observations on changes in the colouration associated with maturation, but we believe that purplish tinge of the base of hind wings sometimes seen in museum specimens may be of this kind.

Survival of adults through the winter appears to be accomplished, at least in southern France, at a cost of high mortality, which Grassé (*l. c.*) attributed to abrupt changes in temperature, both cold and heat being injurious; he concludes, that the species is not well adapted to the Mediterranean climate, but a female in a cage survived for 1½ years; Talbot (1951) also recorded an adult surviving in captivity for 284 days. Volkonsky (1937b) and Zoheiry (1937) recorded very high (up to 97.3%) mortality during hopper development, but Volkonsky succeeded in greatly reducing it by rearing hoppers in a cage kept at 25°C during the night.

BEHAVIOUR; MIGRATIONS.—Grassé (1922) carried out some experiments on phototaxis and thermotaxis in this species, but observations on its behaviour on nature are practically non-existent. Its dendrophilus habit is well known and it appears that adults descend to the ground only during mating and oviposition, as described by Fedorov (1927). Rambur (1838) recorded that in Andalusia adults occur singly on trees and make only short flights when disturbed.

Night flights appear to be exceptional in *A. aegyptium*, since Bogush (1948) recorded only two individuals taken in a whole season of light trap catches in Russian Central Asia when other Acrididae were taken in very large numbers and M. Remaudière has sent us one individual taken at light in Marseille; no other records are known to us.

An unusual record sent by Wing-Commander Kemp concerned a female *A. aegyptium* which flew on board ship at 2 p. m. G. M. T., 5th March 1951, when the ship was in the Mediterranean at Latitude 33°40'N. and Longitude 24°20'E., 100 miles north of the Egypt-Libya border and 90 miles south of Crete; wind at the time was from E. S. E., 13 knots (Beaufort scale force 4). This appears to be the only record of this species on a long flight, undoubtedly assisted by the wind. This isolated case, however, lends no support to an old report of an invasion of Bulgaria in 1890 by «*Acrydium aegyptium* Tump.», presumably in swarms, which were reputed to arrive from Egypt

and caused devastation of the Gorna-Djumaia and the Kocharinovo areas; there is no doubt that the origin of the insects was deduced from the specific name, which itself may have been the result of incorrect determination; unfortunately, we were unable to trace the original report and the above information is taken from an official summary (Trinchieri, 1926).

Swarming of A. *aegyptium*, however, has been repeatedly reported from Egypt. According to Zoheiry (1937), «invasions» have occurred in the Maryiut district (near the Mediterranean coast) every year in 1925-1928, and in the Assyut district in 1927-1931. Swarms were said to invade cultivated areas usually in March-April and to lay eggs, presumably, in irrigated ground, the resulting hoppers and adults causing considerable damage. Since swarms were reputed to come to Assyut from the deserts to the east and west of the Nile, it was supposed that they consisted of adults of the previous year which hibernated somewhere in the desert. An expedition organised in March 1931 found adult of A. *aegiyptium* in wadi Assyut east of the Nile, though most of them were dead; according to bedouins, swarms also hibernated in wadi Doua in the Kharga oasis. Invasions of the Maryut district were said to originate from the west. We are, however, reliably informed by Mohammed Hussein Bey that no actual swarming, or swarm flights, have ever been observed and such outbreaks as occur from time to time in irrigated areas of Egypt are due to local breeding. The infestation, however, may be high, as can be seen from Figs. 63-66.

The absence of gregarious tendencies in this species was confirmed by Maria Volkonsky (1943) who said that A. *aegyptium* remains unchanged in its behaviour even when densely crowded in a cage.

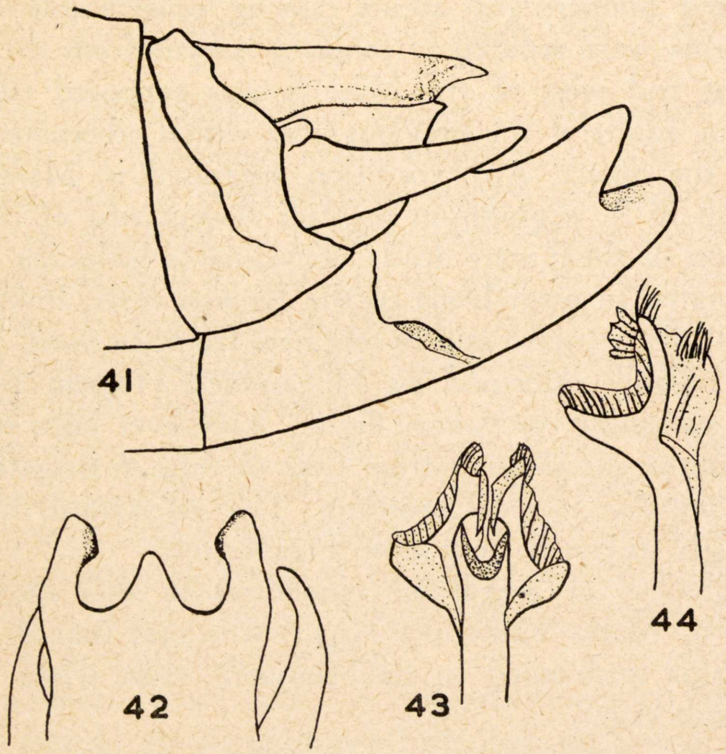
ECONOMIC IMPORTANCE. — Occasional damage of various trees, shrubs, cotton and tobacco by A. *aegyptium* have been reported from several countries, but it is only in Egypt that the damage has been known to reach serious proportions (Figs. 63-66) requiring control measures. As could be expected from the climbing habits of these insects, the usual method of spreading poisoned bait on the ground proved to ve ineffective, as they would not come in contact with the bait. Various sprays and dusts are, therefore, used against hoppers and adults.

Anacridium rubrispinum Bey-Bienko

Text-figs. 8, 41-44; Plates, Fig. 60.

1948. *Anacridium aegyptium rubrispinum* Bey-Bienko, C. R. Acad. Sci. U. S. S. R., 60: 499.

♂. Pronotum comparatively narrow and slender; median carina, in profile, convex, deeply incised by transverse sulci; prozona constricted, convex; metazona weakly widened, slightly



Figs. 41-44.—A. *rubrispinum*, male: 41, lateral view of abdominal end. 42, ventral view of subgenital plate. 43, aedeagus, frontal view. 44, do., lateral view.

convex, with rectangular posterior margin; lower margin of the lateral lobe broadly rounded.

Prosternal tubercle subconical, slightly compressed laterally, at the apex more or less acute. Elytron comparatively short,

broad and moderately projecting beyond the apex of the abdomen. Wing comparatively broad and little narrowed to the apex. Hind femur long and broad, ratio of length to width 4.6-4.9.

Subgenital plate, in profile narrow, with narrow lower and comparatively broad upper lobe, viewed from below middle lobe elongated, tongue-shaped, with rounded apex; lateral lobe long, narrow with rounded apex, and distant from the middle lobe. Cercus short, weakly incurved, slightly projecting beyond the middle of the subgenital plate.

Aedeagus with short, strongly chitinous, moderately broad lobes (Fig. 43).

Colouration brownish-grey; antenna dark, almost black, except first 3-6 light segments. Elytron with indistinct small dark spots or without them. Basal disc of wing light violet or yellowish, fascia light brownish infumate. Hind tibia above and inside greyish-blue; external tibial spines on both sides, and innerside of the internal spines in the basal half yellowish, then, with orange-red ring and almost black apex; outside of the internal spines orange-red with black apex.

♀. As the male but larger and more robust. Ratio of length to width of the hind femur 4.6-4.9.

PERSIA: Prov. Baluchistan, Surah, IV.1949, 1 ♀ (Vakhshouri) (Brit. Mus.).

AFGHANISTAN: Hari-Rud, 1889, 1 ♀ (Brit. Mus.). Jelalabad (Bey-Bienko, 1949).

PAKISTAN: Chiltan Forest, 7000 ft., 14.V.1931, 1 ♀ (Capt. D. Harrison) (Brit. Mus.). Quetta, 1 ♀, 31.III.1931 (Ind. Mus.). Sind, Chachro, 27°7′N., 70°8′E., 28.V.1934, 1 ♀; I.VI.1934, 1 ♂ (D. R. Bhatia) (Brit. Mus.). Khewra, Salt Range, Punjab, 24.IX-X.1930, 8 ♂♂, 10 ♀♀. Choa, 10 m. from Khewra, Salt Range, Punjab, 15-21.X.1930, 1 ♀ (Dr. S. L. Hora & Dr. H. S. Pruthi). Peshawar, 10.VII.1891, 1 ♀. Karachi, 1 ♂ (Cumming) (Ind. Mus.). Karachi, 23.X.1949, 1 ♂ (B. P. Uvarov).

INDIA: Jodhpur, 10.IV.1948, 1 ♂ (Gurdas Singh). Dehra Dun, IX.1918, 1 ♀ (Forest Zool. Coll.) (Brit. Mus.); 23.X.1949, 1 ♂ (B. P. Uvarov).

SYSTEMATIC NOTES

This species was described from Baluchistan (Husdar), on three females, as a subspecies of *A. aegyptium*. It is possible now on the basis of larger material of both sexes to regard it as a good species. It is very near to *A. aegyptium* but differences in the structure of aedeagus and in the colouration of the spines of hind tibia are stable and sufficient for its separation.

Anacridium deschauenseei Rehn.

1941. *Anacridium deschauenseei*, Rehn., Trans. Amer. Ent. Soc., 67: 254, f. 1, 2, 3; Plates, Fig. 56.

As the type has not been re-examined, and the male remains unknown, it is impossible to discuss the affinities of this species, described from northern Siam, quite outside the distribution range of the genus (see p. 11). It differs, however, from all species by its large size.

Ratio of length to width of the hind femur 4.7.

Anacridium flavescens (Fabricius)

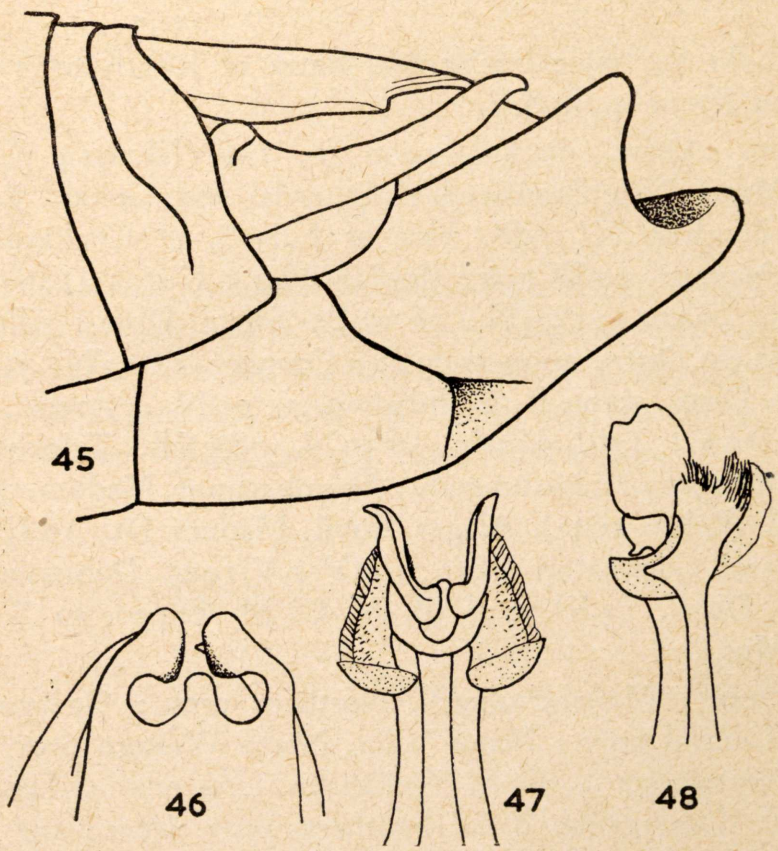
Text-figs. 6, 45-48; Plates, Fig. 58.

1793. *Gryllus flavescens*, Fabricius, Entom. Syst., 2: 52, no. 24.
1813. *Gryllus Locusta crucifer*, Stoll, Spec. Saut.: 30, pl. 14*b*, f. 51.
1839. *Acridium semifasciatum*, Serville, Ins. Orth.: 657.
1870. *Acridium pardalinum*, Walker, Cat. 3: 587.
1910. *Orthacanthacris flavescens*, Kirby, Syn. Cat. Orth. 3: 445, no. 10.
1923. *Anacridium flavescens*, Uvarov, Ann. & Mag. Nat. Hist. (9) 11: 488.

♀. Pronotum comparatively small and slender. Median carina, in profile, almost straight and moderately incised by transverse sulci; prozona weakly constricted almost subcylindrical; metazona weakly widened backwards and feebly convex,

its posterior margin broadly obtusangulate; lower margin of the lateral lobe broadly rounded and irregularly curved.

Prosernal tubercle strongly compressed laterally, its apical part, in profile, oblique in front, apex obtuse. Elytron long,



Figs. 45-48.—A. *flavescens*, male: 45, lateral view of abdominal end. 46, ventral view of subgenital plate. 47, aedeagus, frontal view. 48, do., lateral view.

projecting far beyond the apex of the abdomen. Wing narrowed to the apex. Hind femur comparatively long and broad, ratio of length to width 4.4-4.6.

Subgenital plate, in profile, broad, with broad lobes; viewed from below middle lobe short, tongue-shaped with rounded apex; lateral lobe with strongly widened apex, distant from the middle lobe. Cercus moderately long, strongly incurved. Aedeagus with narrow, elongate lobes, similar to that of *A. aegyptium*.

Colouration ochraceous or yellowish-brown; antennae brown, with light first two segments. Elytron with weak indistinct dark spots, or without them. Basal disc of wing pale yellow, with infumate-brownish fascia along the external margin, reaching slightly beyond the middle of the margin. Hind tibia above and inside greyish-violet; all tibial spines dark red with black apices.

♀. As the male but larger. Ratio of length to width of the hind femur 4.7-4.8.

INDIA: Orissa, Barkul, 1000 ft., 1-3.VIII.1914 (Gravely) (Brit. Mus.). Neighbourhood of Dhurdal and Gokak. Belgaum distr., Bombay, XI.1928. Base of hills S. of Chakardharpur, Chota Nagpur, 29.IX.1911 (Indian Mus.). Kistna Distr., north Madras; Salem, 11°39'N., 78°12'E., Salem Distr.; Shervaroy Hills, Salem Distr., 2000-4000 ft.; Coonoor, 11°20'N., 76°50'E., Nilgiris Distr., 5000 ft. Coimbatore, 11°00'N., 77°00'E., Coimbatore Distr.; Trichinopoly, 10°50'N., 78°46'E., Trinchinopoly Distr.; Muganjur; Nedungadu; Shembaganur, Madura, 9°55'N., 78°10'E. (Rehn, 1941). Alagar Kovil, Madura Dt., 18.III.1936, Madukarai, Coimbatore Distr., 19.IV-1.V.1937. Dohnavur, Tinnevelly Distr., 13.III.1936 (B. M.-C. M. Exped. to S. India) (Brit. Mus.).

CEYLON: Marichchukardi, Northern prov.; Godapotugala, North Central prov.; Marai Villu, North Western prov.; Sigiriya, Central prov.; Bibile, Wellanaya, Uva prov.; Tissamaharamaya, Kataragama, Yala, Southern prov. (specimens in the National Museum, Colombo; data kindly communicated by the Director).

SYSTEMATIC NOTES

This species differs sharply from all others by the wing fascia which runs along the edge of wing. By the structure of aedeagus, it belongs to the group of *A. aegyptium*.

Anacridium illustrissimum (Karsch)

1896. *Cyrtacanthacris illustrissimus*, Karsch, Stett. Ent. Zeit., LVII, p. 297, no. 60.

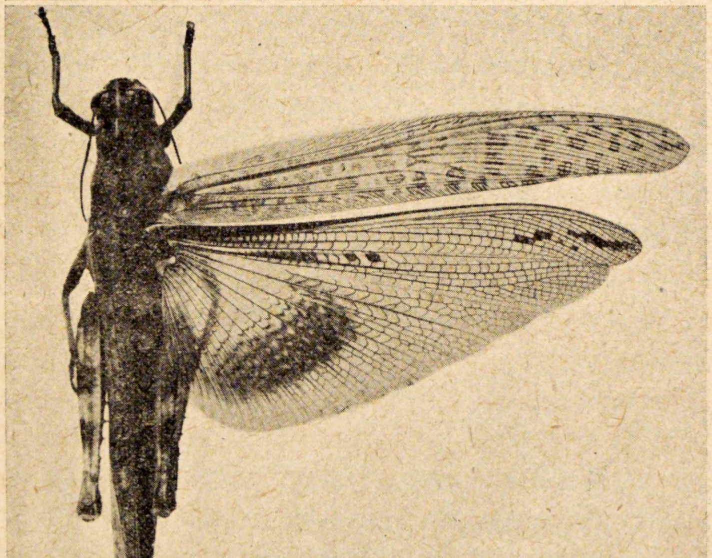
1907. *Acridium illustrissimum*, Finot, Ann. Soc. Ent. France, LXXVI, p. 320.

1910. *Orthacanthacris illustrissima*, Kirby, Cat. Orth., p. 446, No. 11.

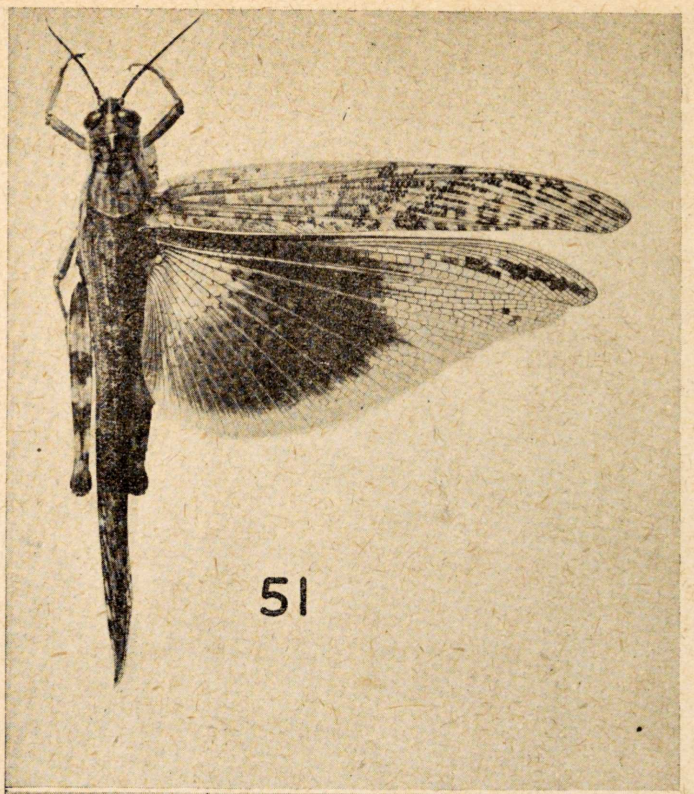
Systematic notes

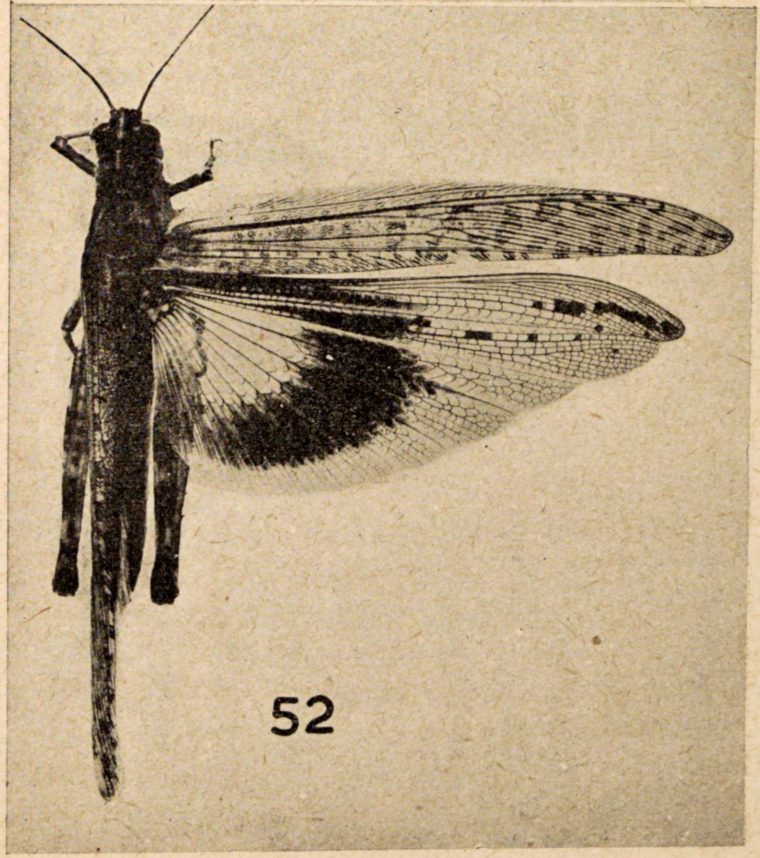
This species was described on a single female from Cameroon (Lolodorf, 3°11'N., 10°44'E.). It was not possible to examine the type and therefore the systematic position of this species is not clear, but it appears, from its description, to differ from all known species by the entirely black hind wings.



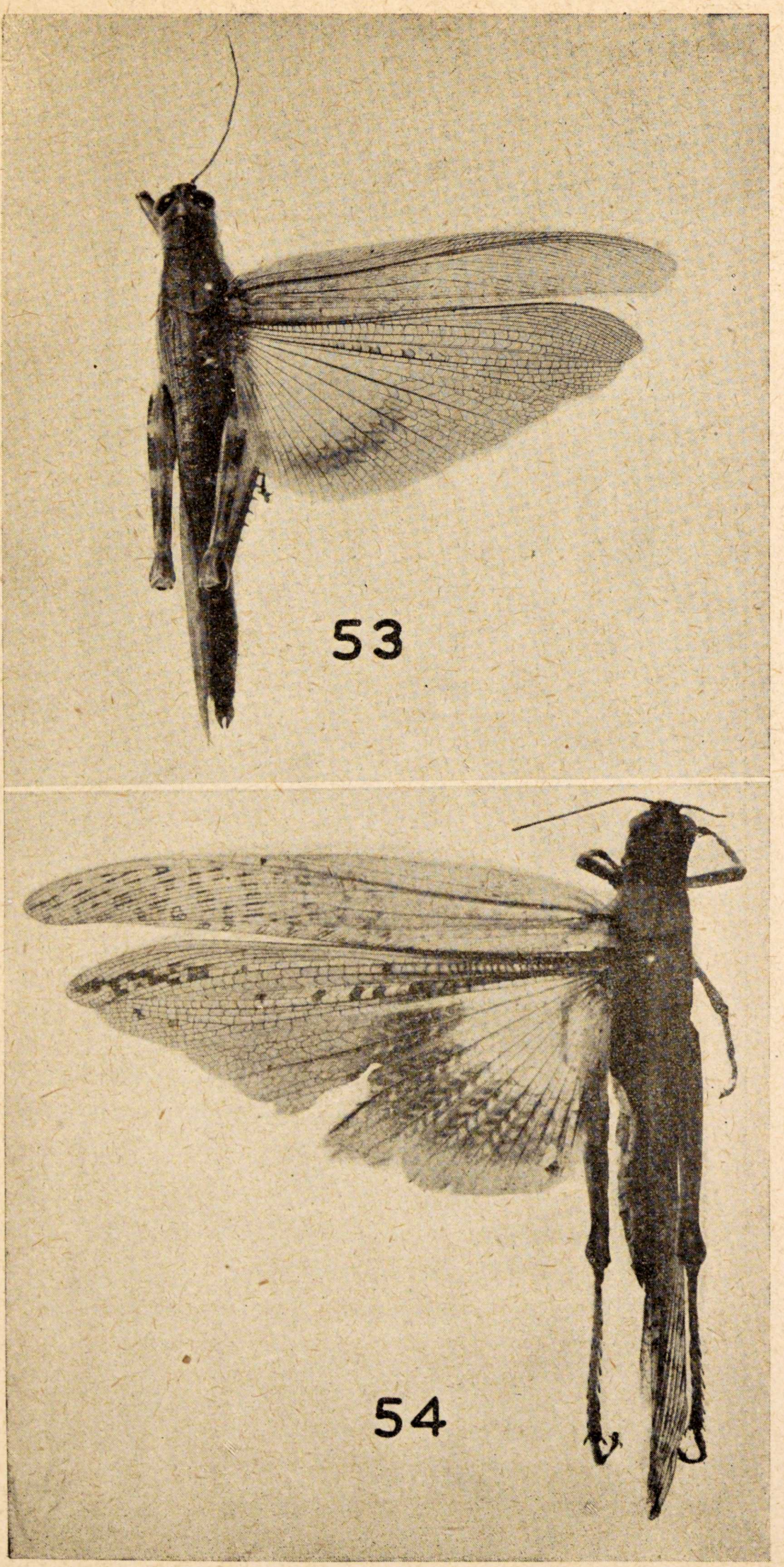


Figs. 49-50.—49, *A. melanorhodon melanorhodon*, Female, natural size. 50, *A. melanorhodon arabafrum*, Female, natural size.

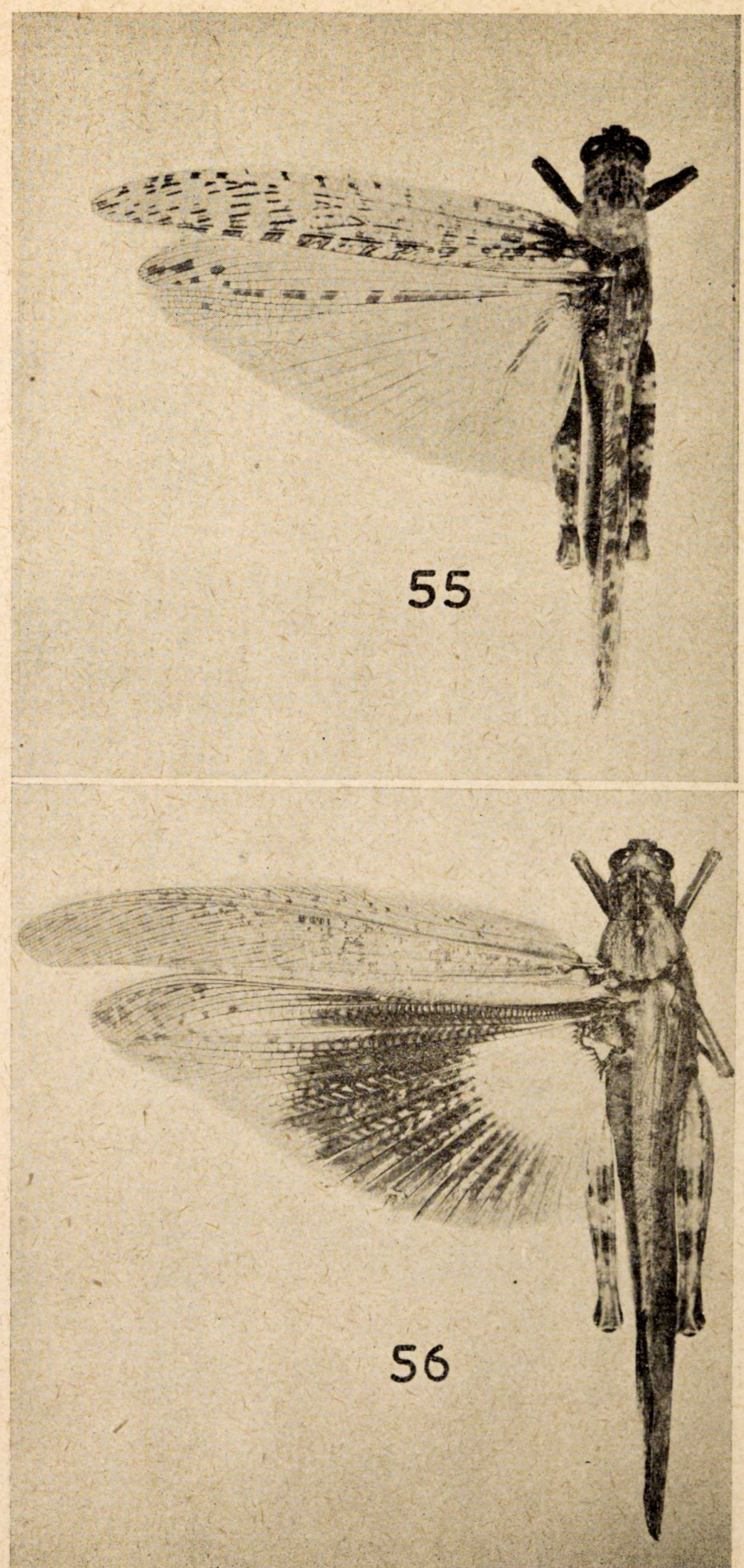




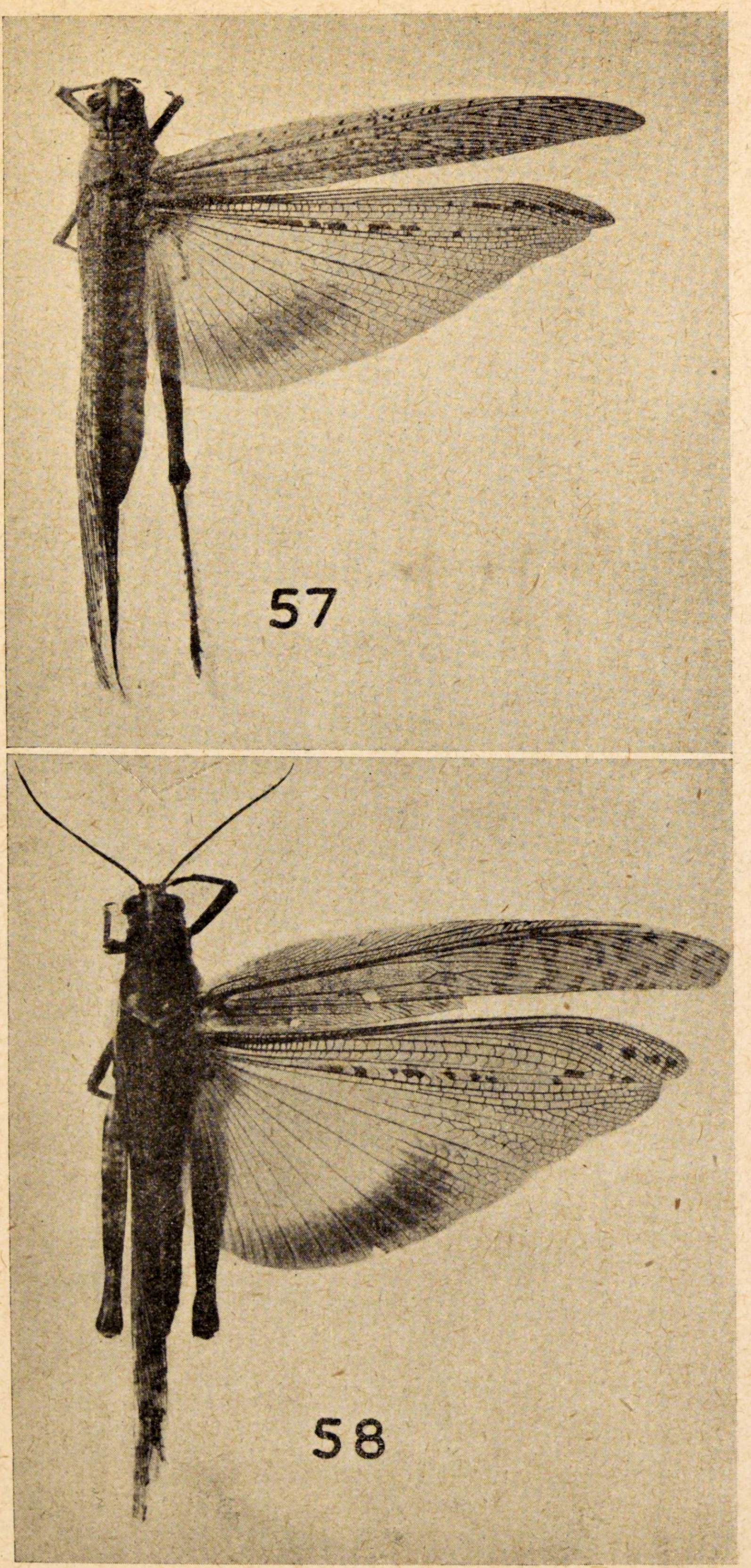
Figs. 51-52.—51, *A. wernerellum,* Female, natural size.
52, *A. moestum,* Female, natural size.



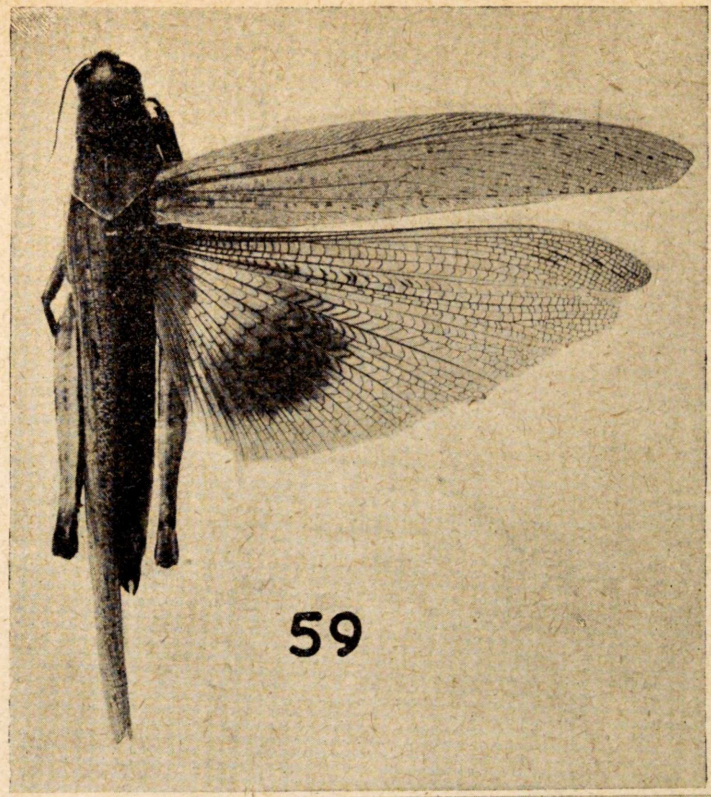
Figs. 53-54.—53, *A. rehni*, Female, natural size. 54, *A. eximium*, Female, natural size.



Figs. 55-56.—55, *A. incisum*, Male, 1.5, natural size.
56, *A. deschauenseei*, Female, natural size.



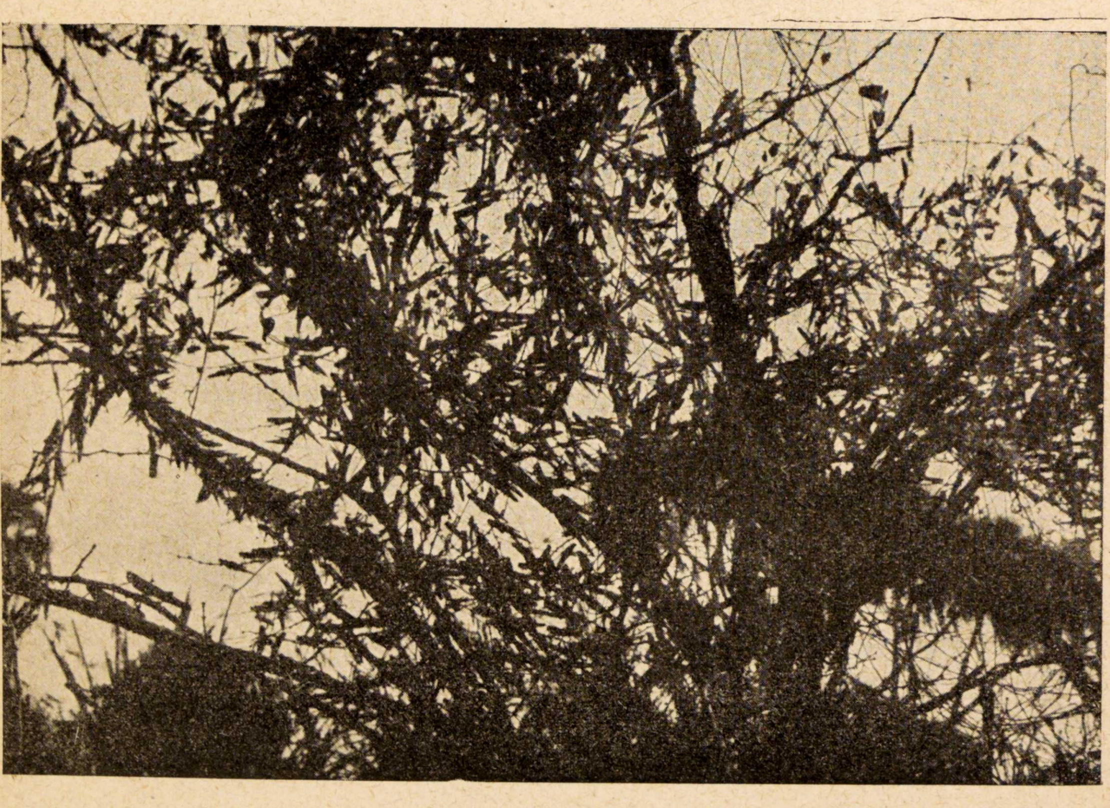
Figs. 57-58.—57, *A. burri,* Female, natural size. 58, *A. flavescens,* Female, natural size.





Figs. 59-60.—59, *A. aegyptium,* Female, natural size. 60. *A. rubrispinum,* Female, natural size.





Figs. 61-62.—A swarm of *A. melanorhodon* on acacias. Tessenei, Eritrea. Photos Macpherson. Desert Locust Survey.





Figs. 63-64.—63, Adults of *A. aegyptium*, damage by which is illustrated in Figs. 64-66. Assiut, Upper Egypt, October 1951. Photo by Locust Research Organisation, Egypt. 64, Damage to dates by *A. aegyptium*. Assiut, Upper Egypt. October 1951. Photo by Locust Research Organisation, Egypt.



Fig. 65.—Prune trees defoliated by A. *aegyptium*. Assiut, Upper Egypt. October 1951. Photo by Locust Research Organisation, Egypt.

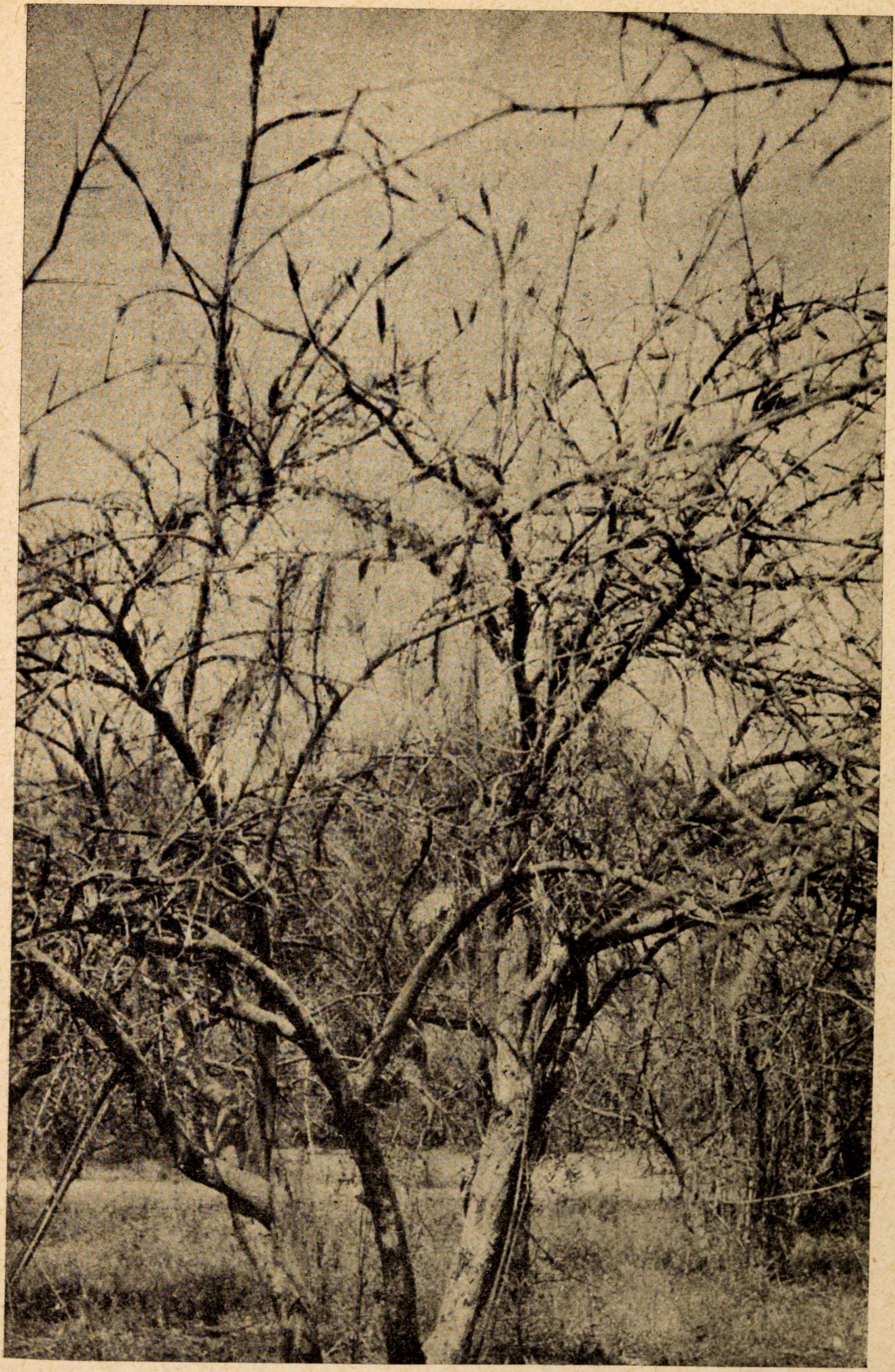


Fig. 66.—Pomegranate trees defoliated by *A. aegyptium*. Assiut, Upper Egypt. October 1951. Photo by Locust Research Organisation, Egypt.

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